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THE IRON AGE

New York, June 19, 1924

ESTABLISHED 1855

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Production Methods on Large Oil Engines

Savings Effected in Use of Some Special Machines—Ingenious
Fixtures on Standard Machines Help to
Reduce Costs

BY L. S. LOVE

THE building of large machines, as is well known, ordinarily involves the use of job shop methods, rather than permitting the use of production methods, such as those recognized in the automobile industry. The De La Vergne Machine Co., New York, builder of oil engines, ice machines, etc., is an exception. It has worked out a combination of job shop methods and modified automobile practice which has materially reduced costs in many cases, at the same time permitting the maintenance of accuracy and rigidity required to pass work through the inspection department. In some instances special machines have been developed to accomplish the work, effort having been made, however, to keep such special appliances as simple as possible.

Extensive use is being made of the capability of modern grinding machines to care for large work nearly as advantageously as grinding does on smaller work. This practice extends even to the grinding of heavy cast iron parts. Naturally, even on work of this nature, where different sizes and shapes of castings are used for nearly every job, there is a multiplicity of smaller

parts, such as screws, studs, boxes, piston pins, oil pump bodies, etc. Effort is made to design interchangeability in these parts, so far as is possible.

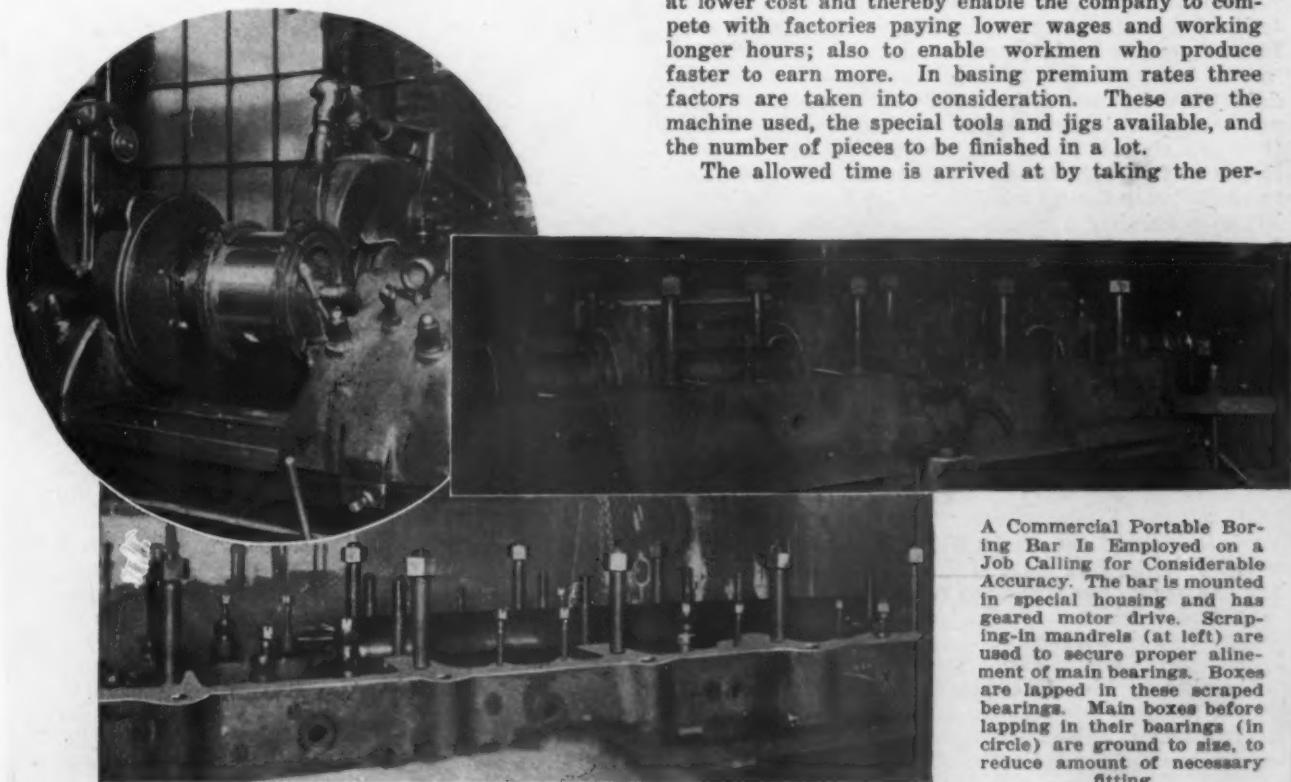
An extensive automatic screw machine and turret lathe department is maintained for the manufacture of such parts on a production basis, more or less paralleling automobile practice in this respect. In the shop handling this class of work machines are arranged in groups according to type rather than according to sequence of operations.

To save time of erectors, wide use of scraping-in mandrels is made. This practice permits sending to the erecting floor, parts such as beds, pistons, pins, rods, boxes, etc., which are already about three-fourths fitted, thereby greatly reducing the time needed for final fitting during erection.

In several cases operations have been so combined that one set-up is sufficient for the performance of more than one machining operation. The influence of wartime practices in machining is also apparent in some of the operations.

A premium system has been introduced, the aim of which is said to be twofold: To have work performed at lower cost and thereby enable the company to compete with factories paying lower wages and working longer hours; also to enable workmen who produce faster to earn more. In basing premium rates three factors are taken into consideration. These are the machine used, the special tools and jigs available, and the number of pieces to be finished in a lot.

The allowed time is arrived at by taking the per-



A Commercial Portable Boring Bar Is Employed on a Job Calling for Considerable Accuracy. The bar is mounted in special housing and has geared motor drive. Scraping-in mandrels (at left) are used to secure proper alignment of main bearings. Boxes are lapped in these scraped bearings. Main boxes beforelapping in their bearings (in circle) are ground to size, to reduce amount of necessary fitting.

formance of a first-class man working under the most favorable conditions. In making rates the time setting men check over the machine, the tools, jigs, etc., to see that they are all complete and in best working order, and that proper feeds and speeds are used. To the time made on this test 50 per cent is added to arrive at the amount of allowed time. Where complaints have been made, a careful check is made with records of previous performance to correct any possible mistakes.

No reductions in allowed time will be made, except in cases where a typographical error has been made or where a more improved machine or set of tools is provided. In cases where the time is considered too high, a committee of three workmen is called upon to determine what the time allowance should be. As so many factors enter into the setting of these rates, it is essential that both the management and workmen approach the affair in a spirit of good will and in good faith.

It was formerly the practice to bore vertical engine bed plates for the bearings in a standard type of floor borer with an 8-in. bar. The present method, while it does not save time, is considered better, in that it assures better alinement of the various bearings and releases other machines for other classes of work. The question of alinement is serious in cases of bed plates to carry four cylinders, as these plates have five bearings widely spaced, making for spring in the bar unless it is very rigidly held.

The device now used is a commercial portable boring bar carrying three boring tool sleeves. The bar is mounted in two rigid housings one at each end, these having been built by the company. The drive for the bar is a very simple gear reduction with two speed changes from a direct connected motor. The feed for the tool carrying sleeves is by a screw which runs lengthwise of the bar in a slot for that purpose. Turning the screw by handwheel and gear reduction at one end of the bar allows for hand setting when the bar is stationary. Blocking the handwheel so that it does not turn while the bar turns provides power feed. The middle of the bar is provided with a steady rest or auxiliary-bearing which is mounted on the planed surface of the bedplate and bolted in place, thereby assuring centralization of the bar while at work.

These bearings and caps are next scraped to a scraping-in mandrel. In this case considerable time is saved which would otherwise be spent on the erecting floor. The operation more or less takes the place of line reaming, which would be impracticable on a job of this size, as it assures a true alinement for all bearings in the bedplate. Also it assures proper depth for the bearings from the planed surface of the plate, or centerline. A surface gage with indicator mounted on the finished surface of the plate checks this bearing depth.

The boxes which fit in these bearings were formerly finish turned before fitting in place. These boxes are now rough bored and turned in turret lathes after which they are slotted to provide anchors for the babbitt liners. After babbitting they are finish bored and turned between flanges within 0.020 in. This 0.020 in. is left as a grinding allowance. They are then split before grinding. In the splitting operation, springing of the metal may cause them to open or close several thousandths of an inch. From the grinder, they are delivered to the scraping floor where they are lapped into the bearings which have already been scraped. In this manner considerable fitting time formerly needed on the erecting floor is saved.

Horizontal engine beds also present some interesting developments in this shop. The 8-in. floor borer already referred to has been so added to that it will now perform two operations at once, one at 90 deg. to the other. A new column with an 8-in. boring bar has been built by the De La Vergne Machine Co., and mounted on the floor plate of the machine. This auxiliary bar has its own drive and feed. It bores and faces the cylinder, while the main bar bores and faces the bearings. This addition to a standard machine saves 50 per cent on the operation mentioned.

Another machine developed and built by the De La Vergne company is a traverse head shaper with 6½-ft. stroke. This machine is operated by a reversible motor and pushbutton control. The ram is provided with a

double rack. Power cross feed of 8 ft. and power down feed to the head are available. The job for which the machine was built is planing the lower half of split bearing joints in horizontal engine beds. This method is considered no more satisfactory than the previous method, so far as results are concerned, but it is practised because it has distinct advantages.

The company formerly used a large planer, wide enough to take the length of these bed castings across between the housings. This planer was large and expensive in operation, when considered in the light of the work to be done on it. It was kept busy only a very small percentage of the time. It occupied a great deal of shop room needed for other purposes. The shaper does a good job, does it quickly, can be set up in less time, occupies less room and is a much smaller investment than the planer.

Semi-universal angle fixtures are used in this shop for handling unusually heavy castings. Cylinder heads weighing as much as 2200 lb. are mounted on these fixtures for drilling the various holes required. The cylinder head bolt holes are 26 in. deep and 2 in. in diameter. Not only is this attachment used in this operation and also in drilling smaller holes, tapping and setting studs, but while mounted on this fixture under the same radial drill spray well holes are bored at an angle of 25 deg. The use of the fixture saves about 25 per cent in time as compared with the former method of several set-ups for this work.

Oil engine crankshafts call for certain features which have brought forth a number of special devices. One of these operations is drilling oil holes from one crankpin through the web to the next crankpin. This work is done in a floor type of horizontal boring, drilling and milling machine. The shaft is mounted on a revolving table and a setting-up angle fixture is bolted to the crankpin at the starting end. This fixture is brought square with the spindle of the machine, thereby assuring the correct position of the shaft and the proper angle for the hole. The fixture also carries a hardened drill guide bushing.

Holes are 24 to 26 in. deep. A 19/32-in. hole is put through first, followed part way by an 11/16-in. drill. The smaller hole is tapped for ¾-in. pipe which will clear in the larger portion of the hole. The operation, including setting-up, requires 5 hr. Coolant to the drill is applied through a stuffing-box at the front end of the machine spindle. Blocks are set in the revolving table on which the stuffing box slides to prevent its turning. The coolant is delivered through the drill. A portable tank on which is mounted a motor driving the pump is employed with a flexible tube to the stuffing box.

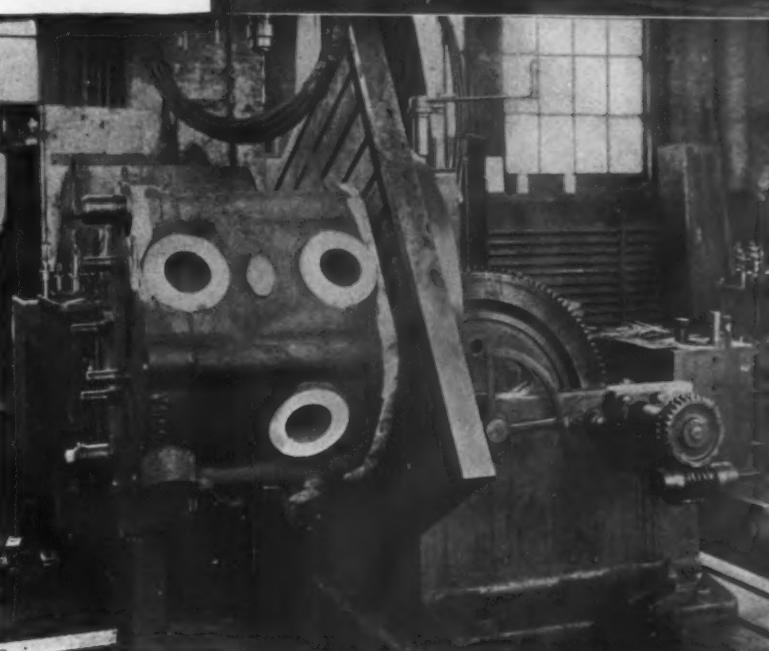
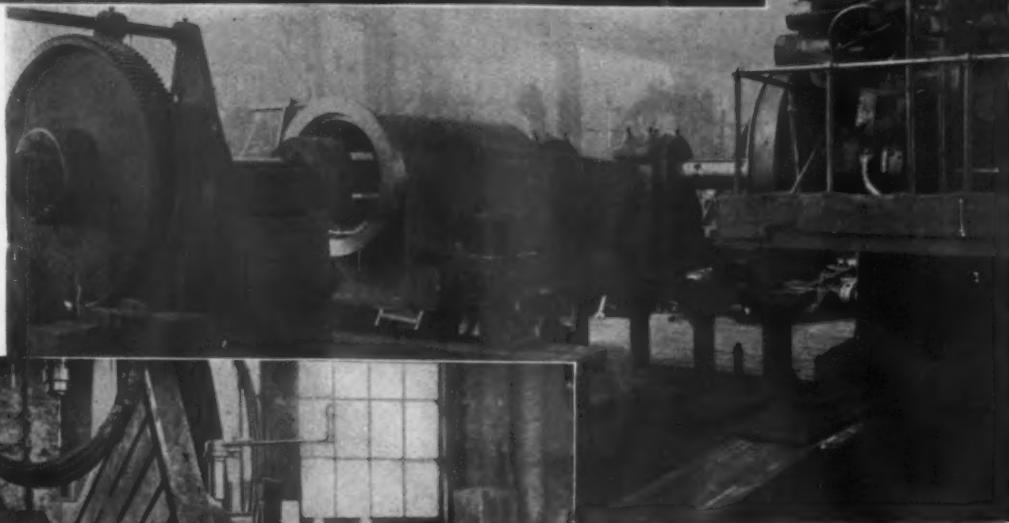
While the shaft is mounted on the revolving table, it is turned and the holes in the flange at one end are drilled. These require considerable accuracy in location and consequently a drill jig is used. This plate is bolted to the flange and after the first hole is drilled, the plate being located from the center of the shaft, a pin is driven in the first drilled hole and through the jig to hold the latter rigidly in place for the other holes in the flange.

Another difficult drilling operation is performed on crankshafts. Webs are in some cases forged separate from the shaft proper. After rough machining and finish boring, the bore is shrunk on the end of a main journal. Further to assure the web's remaining in proper position in addition to the shrink fit, a dowel pin is driven at the joint between shaft and web bore. Two sizes are used on different sizes of shafts, 1 in. diameter by 3½ in. long and 1½ in. diameter by 4 in. long. It was formerly the practice to drill these dowel holes by hand ratchet which required a day, as there is only 8 in. and 10 in. clearance respectively between the web cheeks. By considerable pressure on a pneumatic tool manufacturer a special type of close quarters pneumatic drill was developed which has reduced the time for this operation to two hours. Square shank drills are used, a short one and a long one being necessary to complete the operation.

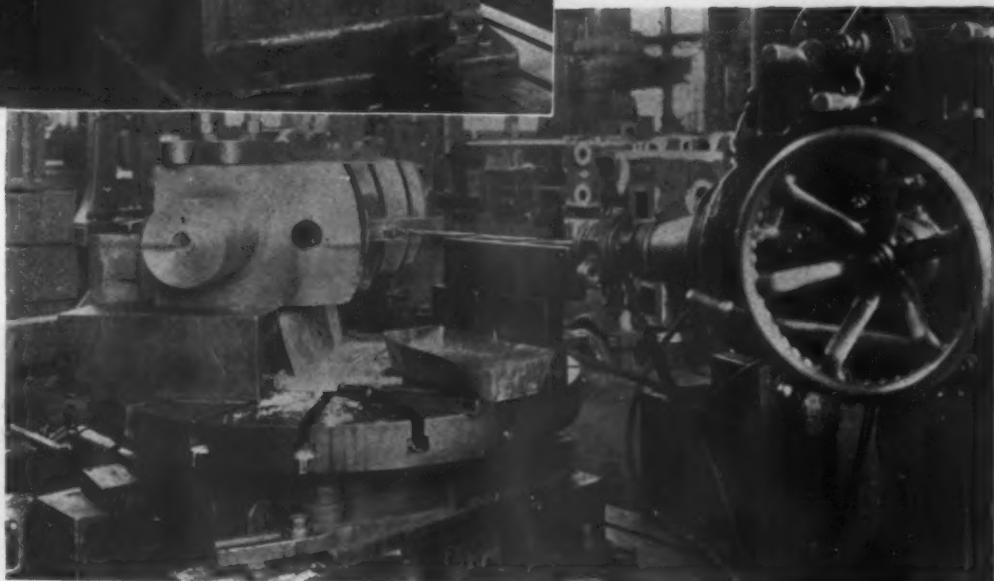
Keyways for flywheel keys are milled on crankshafts with a portable electric milling machine, designed and built by the De La Vergne Machine Co. This device consists of an ell shaped rail, the short



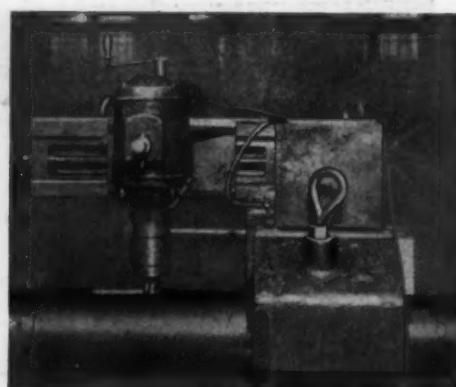
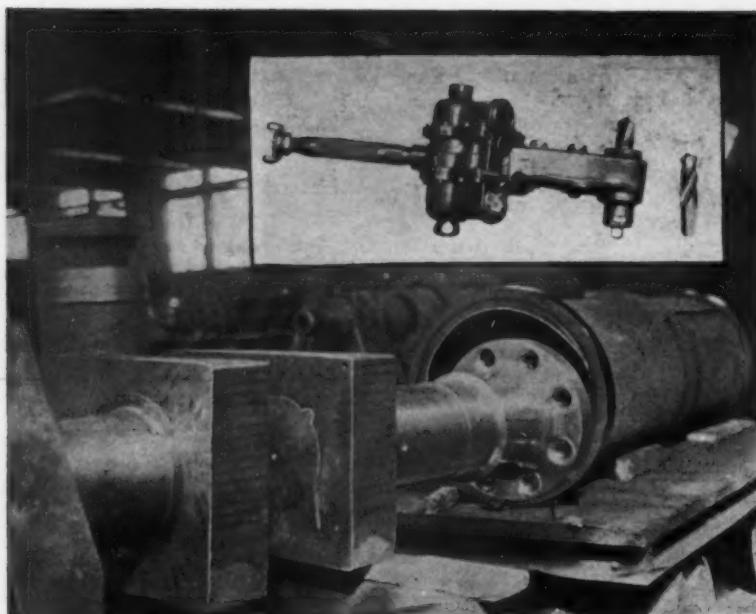
A Special Traverse Head Shaper With 78-In. Stroke Has Been Built by the De La Vergne Machine Co. to Release a Large Planer



Drilling, Tapping, Stud Setting and Boring in One Set-up Are Possible Through Use of Semi-Universal Angle Fixtures for Handling Heavy Castings



Deep Hole Drilling at an Angle Is Possible Through Use of Drill Guide Bushing Holder to Assist in Setting up. A portable power operated coolant outfit is a part of this equipment



A Portable Electric Milling Machine Has Been Found Most Satisfactory to Mill Flywheel Keyways in Large Crankshafts

A Close Quarters Pneumatic Drill (at Left) Is Saving 75 Per Cent in Time of Drilling Dowel Holes in Crankshaft Webs

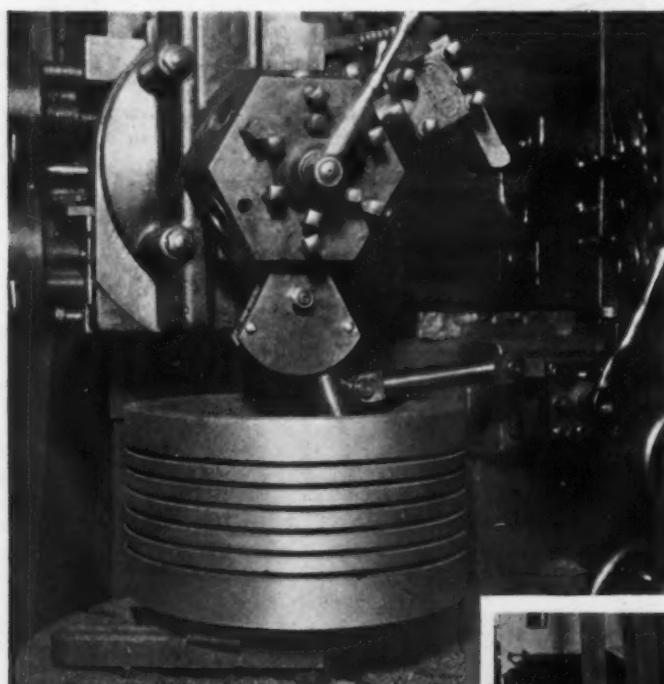
leg of which has a vee to rest on the shaft. A clamp beneath permits the machine to be securely bolted in proper position. Adjustments in three directions are available, and the special motor incorporated in the machine is provided with suitable bearings to take a milling thrust. This machine has a maximum capacity for keyways 3 in. x $\frac{3}{4}$ in. by 18 to 24 in. in length.

The halves of connecting rod boxes are machined complete in pairs and both bolt holes are drilled at one setting in a double spindle horizontal drill, the columns of which are adjustable transversely for varying spindle center distances.

In THE IRON AGE of Feb. 7 an article appeared presenting one method of drilling deep holes. In the De La Vergne plant another method is in use. Connecting rods are all drilled lengthwise through the center for lubrication. For this operation a lathe is used which

turns the rod, the drill being mounted in a fixture on the carriage. The outer end of the rod turns on rollers in a steady rest. A stuffing box or gland is placed in the box end of the rod with rubber packing to prevent leakage of the coolant. A special drill is used which is hollow for the rear two-thirds of its length and is welded to a long tube which extends through the support on the carriage to the tailstock. The drill lips are specially grooved to break chips into very small pieces. Near the end of the flutes and connecting with the hole through the drill is an opening for the passage of chips.

Coolant is delivered from a pump under high pressure through an elbow pipe to a stuffing box on the front end of the carriage where the drill is supported. The coolant is forced to the job around the drill and tube which serves to feed the drill into the job, and re-

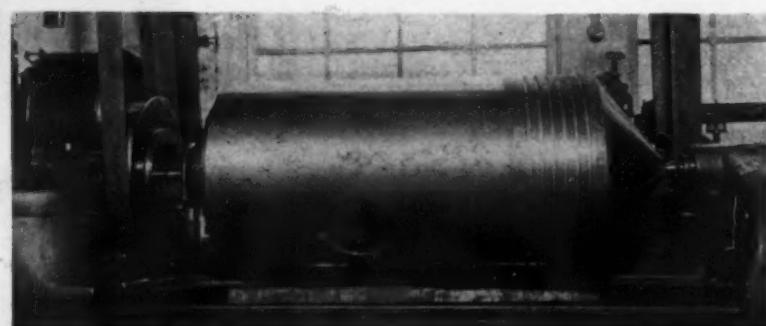


Swinging a Radius Turning Attachment Through Its Arc by Feeding the Side Head of a Vertical Turret Lathe Is a Novel Way of Finishing the Radius in a Cavity



Feeding Coolant Under Pressure Around the Drill and Washing Chips Out Through It Is a Rather Unusual Manner of Handling Deep Hole Drilling

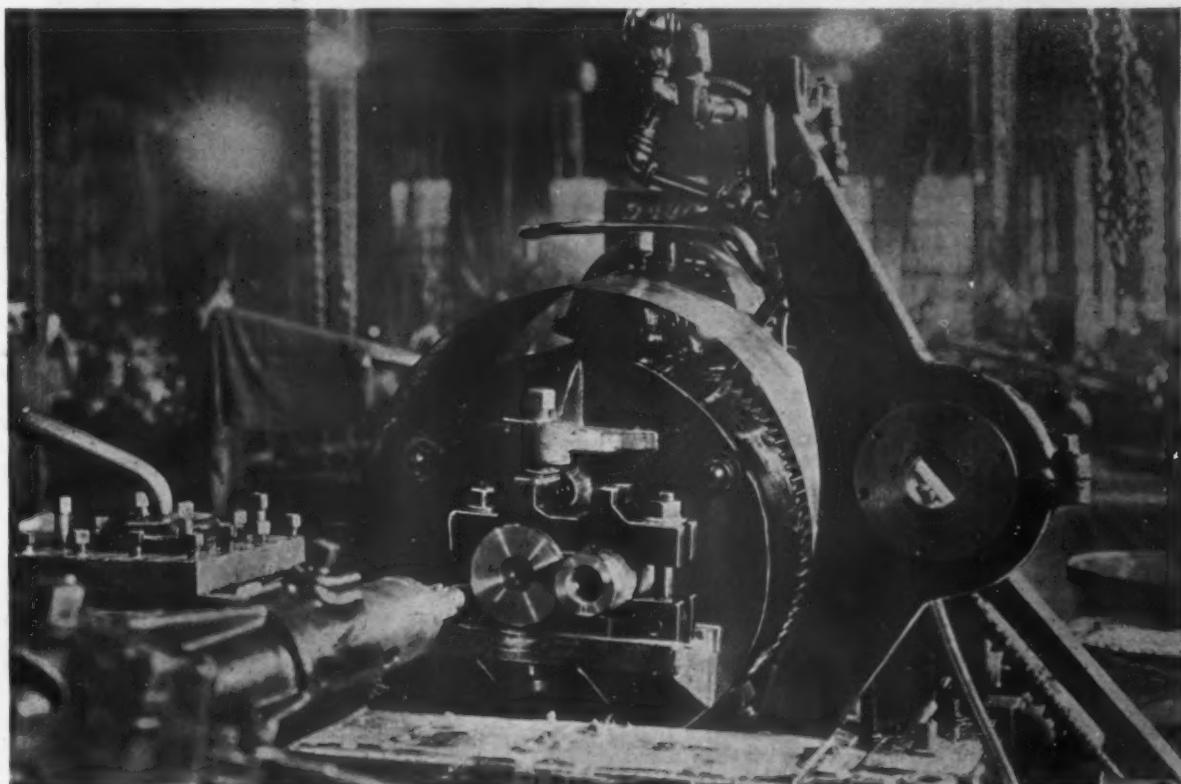
Pistons (Below) are Centered at the Skirt End for Grinding by Use of a Plate Fitting in the Opening With Set Screws to Locate a Dummy Connecting Rod to Swing the Job From the Dead Head Center



turns bearing chips with it through the opening in the drill and through the tube to its far end where the chips are discharged into a strainer, the coolant returning to the tank to be pumped through again. The drill used is 1 in. in diameter, is fed at an average rate of 12 in. per hour and holes up to 6 ft. deep are drilled. This method is saving 50 to 75 per cent over the old method at a negligible tool cost.

A contour forming tool has been designed and made for turning a radius in certain types of piston heads. This tool is used in a side head vertical turret lathe. When mounted in the turret. These piston heads are 21 in. in diameter with a cavity about 7 in. total depth. This is made up of a taper for 4 in., the rest of the depth being secured by means of a radius. In this fixture the tool bar is 10 in. long and swings on a center just below the turret face. By a connecting link, it is attached to

wheel has recently been installed and is showing worthwhile economies. This machine is used for pump brackets, cover plates and other large work where accurate parallel sides are desired. The machine is used with either clamping bolts or magnetic chuck. Some of the reasons for use of this type of grinder are lower finish allowance required on castings, being $1/16$ in. to a side against $1/4$ in. to a side for milling. Many of the thinner castings are rather hard, due to chilling, which makes the grinder preferable for that reason. Time reduction is another advantage which on one job amounts to 2 min. per piece against 13 min. On another job 14 hr. for a lot against 30 hr. Wheel cost at present is running about \$1 per day, but it is expected that this cost may be reduced on further experimenting with wheels. The average saving at present is figured at about 50 per cent.



Thirteen Operations on One Forging with Tools in a Six Side Turret Is an Accomplishment Seldom Achieved.
The set-over reversible fixture makes the operation possible

the side head tool block, the feed of which causes the tool bar to swing through an arc to turn the desired radius of 10 in. These heads are afterward polished to minimize collection of carbon.

Grinding on large work has been resorted to for several reasons. One interesting job of this kind is on pistons which are ground, principally to effect economies in the final assembly. The present method of grinding assures a more accurate job in that the outside surface is square with the pin. It was formerly the practice to rough and finish turn the piston, then bore for the pin. The next step was to mount the skirt end on an expanding chuck to center it, the closed end being central on the machine's tail center, and grind. This did not give the exact squareness desired, although the finish was satisfactory.

The present method calls for first boring for and fitting the pin. A dummy connecting rod stub end is then located on the pin. A plate is set into the skirt end of the piston and the rod is centered in that by means of set screws. This brings the outside central and square with the pin. A driving dog attached to the end of the rod turns the piston on dead centers. After grinding, relief for the pin ends is turned into the piston by means of a cam attachment on the face plate of a lathe, actuating the cross slide, in a manner similar to that used on automobile pistons.

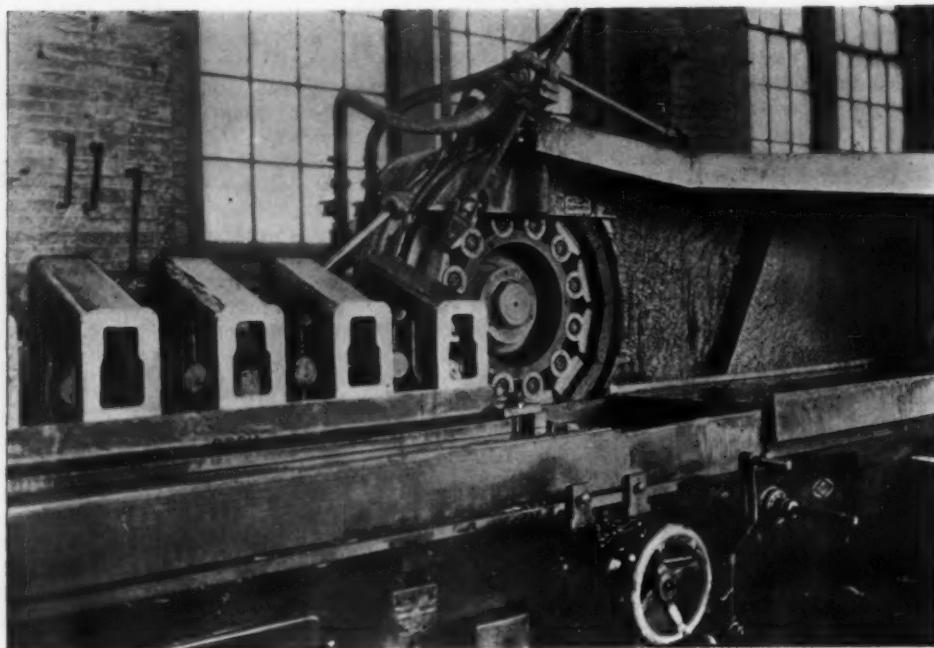
A heavy face grinder with sectional cylinder type

In the turret lathe department are two jobs which are considered worth mention, one as being reminiscent of war days when shell boring was common, the other because of the fixture used.

The boring operation, not shown among the illustrations, consists of boring the hole through piston pins. This is done for two reasons, lightness and to make certain that no weak spots are included in the center of the pin. Further it is found that boring from solid metal is cheaper than to purchase pins forged hollow. This job is handled in a 24-in. turret lathe. A 5-in. drill is driven through a pin 16 in. long in 25 to 30 min. Coolant is introduced at the turret end of the bar.

The other interesting turret lathe operation is likewise handled in a 24-in. machine. This is finishing drop forged oil pump bodies. There are 13 distinct operations, including drilling, counterboring, tapping and facing, some to be performed on two chambers in the pump body from both ends. The set up which permits of handling 13 turret operations with a six-side turret is principally a reversible set-over chucking device and the fact that some of the tools may be used on both ends.

The reversible set-over chucking device consists of a plate with two brackets cast to it. One bracket acts as a grooved slide for the chucking shoe when it is set over or reversed. The other bracket holds a binder screw. The forging is clamped in a pair of straps with two vees in each. The lower strap or sliding shoe



A Large Face Grinder With Sectional Cylinder Wheel Is Saving on Amount of Material to be Removed

has a tongue which fits in the groove in the bracket. A spring locating pin in this bracket, entering one hole or the other of two holes in the lower side of the sliding shoe, centers one chamber or the other of the pump body in position for work. The binder screw tightens a hardened block down on the top strap directly over the centered chamber.

When this chamber is finished on one end, the set screw is released, the locating pin withdrawn and the whole chuck and job are set over until the locating pin enters the hole under the center of the other chamber,

when the set screw is tightened and that end of that chamber finished. The whole job is then pulled out of the holding brackets, reversed and slid back into place, when similar operations are performed on the other end of the body. These pieces are generally put through in lots of 50. Two hours are required to set the machine up. One hour and 52 min. is the allowed time for each forging. The job is usually done in 1 hr. and 15 to 20 min., permitting the operator to earn a substantial bonus of better than a half hour on each forging.

OUTPUT IN MAHONING VALLEY

Percentage of Operations in Iron and Steel Making and Finished Steel

YOUNGSTOWN, June 17.—Seasonal midsummer dullness in the sheet market is reflected earlier than usual this year and operating schedules in the Mahoning Valley for this week are the lowest in a number of years. Of 120 sheet and jobbing mills operated by independent interests, but 20 were scheduled Monday and seven mills of the American Sheet & Tin Plate Co.

Steel ingot production continues unchanged, with 12 of 52 independent open-hearth furnaces active and 14 of 30 furnaces of the Carnegie Steel Co. All independent Bessemer plants in the district are idle, and the Carnegie company is maintaining its two Bessemer departments at a largely reduced rate.

Four independent skelp mills are rolling this week, against none the preceding week. The Republic Iron & Steel Co. has started two skelp mills, the Youngstown Sheet & Tube Co. one and the A. M. Byers Co., one.

The Republic company has suspended its plate mill, after one week's production, but its 14-16-in. bar mill has been placed in operation. The Sheet & Tube company has started its 84-in. plate mill on a reduced basis.

Tube mill operations show the loss of one mill as compared with the previous week, and nine of 17 such units in the Mahoning Valley are rolling.

The sheet mill schedule at the beginning of the week embraced four mills at its Western Reserve works by the Sheet & Tube company; six by the Trumbull Steel Co. at its Trumbull plant in Warren; six mills by the Newton Steel Co. and four by the Thomas Sheet Steel Co. Indications were that other sheet mills in the district would start before the end of the week.

The Sheet & Tube company schedule for the week in the Youngstown district is: One blast furnace, five open-hearth furnaces, one blooming mill part time, 9-in. bar mill, No. 3 skelp mill, rod mill, five tube mills and

reduced puddle mill operations, at East Youngstown; one blast furnace and the 84-in. plate mill at the Brier Hill Works; one blast furnace in the Hubbard group and four sheet mills at the Western Reserve plant, Warren.

The Republic Iron & Steel Co. is operating two blast furnaces, five open-hearts, one blooming mill, 14-16-in. bar mill, three light bar mills, two skelp mills and four tube mills.

The Trumbull Steel company's schedule includes two open-hearts, 13 tin mills, six sheet mills and strip mills at 40 per cent.

The Sharon Steel Hoop Co. is operating at a substantially reduced rate, its active units including one blast furnace and four strip mills.

At its Girard works, the A. M. Byers Co., Pittsburgh, is operating 88 puddle furnaces.

Part of the additional capacity created by the Truscon Steel Co. at its plant in this city, involving a 15 per cent enlargement, has been put into operation. The remaining capacity will be put into use as trade demands warrant. This company is maintaining production at a high rate, manufacturing a variety of fabricated and pressed steel products, in addition to building materials.

The General Fireproofing Co. is holding production at an 85 per cent average. An official reports the receipt of some very attractive business lately for metal furniture.

The principal fabricating interest in this district, a substantial consumer of sheets, light plates, strips and steel bars, reports that by reason of a broad manufacturing program it is obliged to maintain sizable and well-balanced stocks of steel materials. The interest referred to has not permitted its steel stocks to become low or unbalanced and in this respect is regarded as somewhat of an exception.

That business will likely drag bottom this month, at least, is the common expectation, but some revival is anticipated with the political conventions out of the way.

Control of Idleness in Industry

Determining Its Cause and Finding Means to Put Idle Equipment to Work—Producing Goods vs. Harvesting Dollars

BY W. L. CONRAD*

ONE of the chief causes of loss in industry is the idleness of plant and personnel, due both to lack of orders or to causes within the plant itself. An industrial establishment that sets out to remove these causes puts itself beyond competition, due to greater production, lower costs, and more accurate data on which to base selling prices. The accounting system can be made to show not only the cost of idleness, but also its causes, and to indicate the means of their control.

IT is only during the last few years that much thought and investigation have been given to the vast amount of money that has been lost by industrial organizations due to idleness. This idleness is not something new in industry, but has been going on for years in these establishments, and the managers and financiers heretofore have given very little attention to it.

Since the early establishment of manufacturing institutions much of the equipment and plant has remained idle—non-productive—for a part of the time at least. This fact apparently was entirely disregarded, and was considered a necessary evil. A few years ago, however, a number of plants undertook the installation of methods designed to eliminate the expense of idleness, and these plants now are in a position to compete successfully.

Today manufacturers recognize the great amount of idleness that detailed investigation is revealing in industrial plants, and are taking steps to place the responsibility where it rightfully belongs. In the future some means may be developed to relieve the public of the burden of this unwarranted expense.

Productive Capacity More Important Than Accumulated Wealth

Not long after the outbreak of the war it was recognized that the life of a nation does not depend primarily upon the wealth that it has accumulated, but rather upon its productive capacity. Those who predicted a short struggle are now convinced of the error of their judgment, despite the fact that the destruction of life and wealth was enormously greater than was anticipated even by those who said that such a war was unfeasible.

Previous to the war the productive forces of the world were almost, if not entirely, in the hands of those who had gained control through legal title or other means. It soon became evident that efficiency of production was the concern of the whole nation, and not simply that of stock and bond holders. The result was that many limitations of the past were to a great extent disregarded, so far as socially necessary commodities were concerned. Those who could not operate their plants efficiently were not permitted to operate them at all, and these plants were operated under the direction and control of the Government for the best interests of all concerned. This action resulted in such an enormous increase of productive capacity that great leaders have been obliged to recognize the indisputable fact that productive capacity is enormously more important than accumulated wealth.

Fallacy of Incorrect Costs

It has long been the custom of industrial concerns to charge to the product all of the expenses incurred while that article or product was being manufactured.

*Consulting engineer, New York. Abstract of a paper presented at the spring meeting, at Cleveland, of the American Society of Mechanical Engineers.

It requires no experience in bookkeeping to show the fallacy of such an arrangement. Any one at all familiar with economics in any form or with common business principles will fully realize that there are two legitimate operating-expense items:

1—An expense incurred which might be termed the "ownership expense" of the plant, and only its proportionate part of this expense can be charged to the product; this ownership expense, as the name implies, represents the expense incurred in owning a fully equipped plant ready for practical operation.

2—Actual operating expense.

It is obvious that owning a plant involves a certain fixed daily expense, even when the plant is not operating. Careful consideration of the expense incurred while the plant is idle frequently leads to valuable and interesting information. This applies not only to the plant and equipment as a whole, but to its different departments; for it usually is found that, when an honest effort is made to determine the actual reason for the idleness, there is a concentrated attempt to eliminate the causes of idleness. These causes generally are found to be within the plant itself, either in equipment or management.

Consideration of the causes of idleness of plant and equipment of many industrial establishments in the past has given us a general view of the question of production costs. This leads to a simplification of the problem that is worthy of careful consideration. A basic factor which might be brought out by such a consideration is that the cost of owning and maintaining a plant in idleness, where such a plant is properly equipped for efficient operation, will be substantially the same in any part of the country where the equipment can be bought at substantially the same price. This also apparently is true with many other factors that enter into the cost of idleness. Hence a standardization of cost methods which some years ago had been thought impossible is now almost an established fact, and the item "expense of idleness" is one of the important items to be considered.

Expense of Idleness

The ideal condition would be one where every machine and every man performed a certain allotted task each day. If this were accomplished it would be an easy matter to regulate the production cost. Therefore it is vitally important that we have a means to measure that portion of the time during which the men and machines did not perform the task expected of them, and also a means for determining the reason why such task was not performed. Responsibility for the equipment failing to perform its task then can be placed definitely on the section of the management to which it belongs, and steps taken to prevent a recurrence.

The method of obtaining this expense of idleness in any individual plant is much simpler than at first appears, and yet it has been found to be so accurate and the results obtained so great as to be almost unbelievable.

Measurement of Idleness

Idleness of equipment can be measured in several ways. The most logical means so far presented seems to be by a chart, on which will be shown not only what idleness has occurred and how much in the aggregate such idleness has cost, but also in detail, under the proper headings, the department to which this expense belongs. The responsibility then may be placed at once and steps taken to eliminate the causes.

The value of a manufacturing plant is based not

only upon the physical plant itself but upon the organization controlling it and upon its productive capacity. There must therefore be some means of measuring not only the amount of product that it has produced, but also the amount of product that it has not (due to idle equipment), but should have, produced.

All industrial plants are built to produce some article of commerce at a cost which will permit competition with other producers. The value of such a plant, as a producing unit, must depend on its ability to accomplish the object for which it was created. As the product produced should bear only its actual share of the expense incurred in producing it, it is clearly obvious that the part of the plant or equipment which does not render service to the product produced must also bear its share of the expense. When these facts are presented in a logical way any economist, financier or business man will agree that the cost of idle plant or equipment is most important.

An idle plant is just as much a source of expense under the new theory as under the old, but under the new it is charged to the business, whereas under the old it was absorbed by being charged to the cost of the product. It is a foregone conclusion that a manufacturing concern which bases its policy on the new theory will soon get the better of those rivals who adhere to the old method of accounting.

Harvesting Dollars

That we have increased individual efficiency and profit-making efficiency, and perhaps other kinds of efficiency, is not to be denied. Surely, the campaign for efficiency that has been so assiduously waged for such a long time has been seriously and honestly waged. Why, then, have results been so meager? The answer is simple and plain. The aim of our efficiency has not been primarily to produce goods but to harvest dollars. If we could harvest more dollars by producing fewer goods, we produced the fewer goods. If it happened that more dollars could be harvested by producing more goods, an attempt was made to produce more goods, but the production of goods was always secondary to the securing of dollars.

The great difficulty of installing methods designed to eliminate idleness is that the cost-keeping systems in general vogue indicate that such methods are not profitable. In spite of this, economic conditions are forcing us to adopt such methods. The only answer to this is that our cost-keeping systems are fundamentally wrong, and that we shall continue to suffer from inefficiency until they are corrected. Their great error is that they ignore the expense of idleness, when as a matter of fact it costs almost as much to be idle as it

does to work. This is true whether we consider men or machines—capital or labor.

To meet the present and future emergency the cost-keeping system must not content itself with charging all expenses to the product, but must charge to the product only that expense that helped to produce it. It must show by other means the expenses that did not produce anything, and their causes.

Manufacturing concerns eliminate idle labor as completely as they can by discharging workmen who could have been used profitably if work had been properly planned for them. They cannot get rid of idle capital so easily, for it is tied up in plant and equipment. The only possible way to eliminate idle capital, then, is to put it to work. The first step is to find out exactly why it is idle. As soon as this is done, means for putting it to work begin to suggest themselves.

Expense of Eliminating Idleness

The expense of installing methods to prevent idleness, or methods to control the "expense of idleness," is not by any means so great as some would have us believe. While we often have been confronted with the excuse that "it can't be done in our business" or "the benefits to be derived are not sufficient to warrant the necessary expense," we know it can be done, and is being done successfully in many industrial plants where the proper amount of careful thought and planning has been devoted to the subject. Moreover, these plants have found that the direct saving made by eliminating the "expense of idleness" has more than offset the expense of installing and operating methods for its control.

In addition to the direct savings made by eliminating idleness, many other benefits may be derived. Increased production is usually the first noticeable result of such an attempt. It is needless to say that increased production in any well-organized plant results in reduced production costs.

Elimination of waste in manufacturing through proper control and elimination of idleness seems to be one of the most important steps to be taken by those interested in industrial economics. And in this connection it may be well to quote from the late Henry L. Gantt who said, in referring to the expense of idleness, that

The allocation of this expense to those who are responsible for it is the most important economic fact that has been brought to the attention of the business world for many years and, if we will adopt the principle that capital like labor is entitled to a reward only when it produces some desirable result, we shall have taken a long step forward to still the industrial unrest which is rapidly rising about us.

Ferromanganese, High in Silicon, Not Standard Product

WASHINGTON, June 17.—The silicon content ordinarily found in the ferromanganese of commerce does not exceed 1 per cent, so that an alloy used in the manufacture of steel, though it may contain 75 per cent manganese, is not necessarily ferromanganese of commerce, if it likewise contains 9 or 10 per cent of silicon, according to a recent decision of the Board of the United States General Appraisers, New York. It was held that such an alloy was not entitled to free entry under Paragraph 518 of the Tariff act of 1913, as ferromanganese. Protest against assessment of duty was made by the importers, Charles F. Smillie & Co. The importation was invoiced as manganese and duty was levied at the rate of 15 per cent ad valorum under the provision in Paragraph 102 of the act of 1913, for "alloys used in the manufacture of steel."

The claim was made by the importers that the shipment was properly entitled to free entry under Paragraph 518 as ferromanganese. There were two lots in the shipment, one of which was 10.09 in silicon, and 76.54 in manganese, while the other ran 9.17 in silicon and 75.55 in manganese.

The single question, the board held, was whether the material was so composed uniformly as to be generally known and recognized throughout the trade and

commerce of the country prior to the enactment of the tariff law of 1913 as ferromanganese. The board said that testimony offered by the importers failed to answer this question in the affirmative, while that offered by the Government proved the negative of the question. Moreover, the board said, witnesses for the importers were scarcely qualified to submit competent testimony on the subject of commercial designation, while those who appeared for the Government were exceptionally well qualified in that respect. The Government representatives pointed out that the high silicon and the low carbon content would preclude merchandise from being considered as ferromanganese in the commercial meaning of the term and that the principal objection was the high silicon content which, it was stated, in the standard of ferromanganese of commerce, does not exceed 1 per cent of silicon. Accepting this evidence the Board overruled the protest and affirmed the decision of the Collector of Customs.

Domestic sales of oak leather belting reported by the Leather Belting Exchange for May showed a total of 330,268 lb., valued at \$563,107 or an average of \$1.70 per lb. This compares with April figures of 372,428 lb., valued at \$643,929 or an average of \$1.73 per lb., and with figures for May of last year aggregating 512,573 lb., valued at \$947,236 or an average of \$1.85 per lb.

Machine Tools Feature Railroad Exhibit

Wide Variety of Machinery in Operation at Largest Exhibit of Railroad Supply Manufacturers—Large Display of Other Equipment

MACHINE tools were an outstanding feature of the exhibit of the Railway Supply Manufacturers Association, held at Atlantic City, N. J., June 11 to 18, simultaneously with the conventions of Division V, mechanical, and Division VI, purchases and stores, of the American Railway Association.

The exhibit, which was housed in Young's Million Dollar Pier, was the largest yet held, there being more than 390 exhibitors occupying approximately 103,000 sq. ft. of space. Applications for space totaling 15,000 sq. ft. more than available were received.

The showing of machine tools, small tools and gages, pneumatic equipment and materials handling machinery was larger than heretofore. Practically every machine was under power, demonstrations being made on actual railroad and car shop work. There were many items of new equipment shown, most of which have been described in previous issues of THE IRON AGE.

At the exhibit of Manning, Maxwell & Moore, Inc., New York, which was large, a 54-in. Putnam vertical boring and turning mill with improved speed and feed arrangement was in operation machining a locomotive driving box bearing. Centralized control from both sides of the mill and feed control from front were emphasized, a special driving box chuck being also a feature. A standard pattern Putnam double axle lathe was in operation, combination tool blocks for wheel lathes being also on view.

A new Sundstrand splice bar miller of the Rockford Milling Machine Co., Rockford, Ill., a two station machine intended for reclaiming splice bars, was also at this booth and a Sundstrand radius, internal and surface grinder for link blocks was in operation. An automatic four spindle machine of the Cone Automatic Machine Co., Windsor, Vt., was in operation making nut blanks. There was also a 2-B universal turret lathe of the Foster Machine Co., Elkhart, Ind. An 18-in. "coneless" belted motor-driven engine lathe of the Boye & Emmes Machine Tool Co., Cincinnati, was on view and also a 14-in. x 6 ft. portable ball-bearing geared head lathe of the Springfield Machine Tool Co., Springfield, Mass.

A 6-ft. radial drill of the Dreses Machine Tool Co., Cincinnati, was in operation on steel castings, a 28-in. upright of J. E. Snyder & Son Co., Worcester, being also shown. A 32-in. crank shaper of the Columbia Machine Tool Co., Hamilton, Ohio, was in operation on railroad brasses. Other machine tools were the new No. 1 universal grinder; the No. 78 surface grinder and the Yankee twist drill grinder of the Wilmarth & Morman Co., Grand Rapids, Mich. The National Machinery Co., Tiffin, Ohio, had a 1½-in. heading and forging machine in operation, and also double and triple head stay-bolt cutter, and an electric rivet heater. Railway mill supplies and a large number of injectors, inspirators and other steam specialties were included in the exhibit of the Manning, Maxwell & Moore company.

A new model 6-in. vertical shaper was a feature of the exhibit of the Niles-Bement-Pond Co., New York. The new 16-in. Pratt & Whitney Model B tool room lathe was in operation, demonstrating a new reduction face plate cutting a spiral with 12-in. lead. The company's new car wheel boring machine, a 5-ft. "Right Line" radial drill, a 21-in. Le Blond lathe were in operation. Small tools and railroad gages of the Pratt & Whitney Co., Hartford, were displayed.

The improved Betts car wheel borer, a Newton crank planer and a Colburn heavy-duty drilling machine were exhibited in operation by the Consolidated Machine Tool Corporation of America, Wilmington, Del. The new Modern inserted tooth face milling cutter was a feature of this exhibit. William Sellers & Co., Inc.,

Philadelphia, exhibited locomotive injectors but no machine tools. Radial drills in 2-, 3- and 6-ft. sizes were in operation at the booth of the American Tool Works Co., Cincinnati, the features of the 6-ft. machine being demonstrated in connection with boring of pump cylinders and trepanning of side rods. In lathes, a 24-in. heavy pattern unit was on view and also a 16-in. portable lathe. A 28-in. shaper was under power.

Turret Lathes in Operation

A 17-in. swing Hartness flat turret lathe for chucking work was exhibited by the Jones & Lamson Machine Co., Springfield, Vt., the machine being in operation on locomotive bull rings. A new staybolt attachment designed with the new taper thread in view, and intended to machine taper thread stays with or without the button head, also straight threaded bolts, was shown. The attachment may be used on new types or old flat turret lathes of the company. The Hartness "High-Speed" automatic die, and the Flanders ground taps were exhibited.

The 3-A turret lathe of the Warner & Swasey Co., Cleveland, was in operation on electric mine locomotive commutator shells. The overhead piloted turning and facing heads permitting the application of five cutters were features emphasized, as were also the adjustable angle cutter holders with micrometer adjustment. The Potter & Johnston Machine Co., Pawtucket, exhibited its 6-C, automatic chucking and turning machine, machining cast steel piston follower heads.

Vertical turret lathes in 24 and 42 in. sizes were under power at the booth of the Bullard Machine Tool Co., Bridgeport, a moving picture showing the company's new Contin-U-Matic in actual service being also shown. The G. A. Gray Co., Cincinnati, demonstrated its 36 x 36 in. by 10 ft. "Maximum Service" reversing motor-drive planer.

A 32-in. shaper incorporating recent improvements, including gravity lubrication and geared drive, was demonstrated by Gould & Eberhardt, Newark, N. J. One of the company's shapers built more than 75 years ago and incorporating V-type ram ways was a center of interest. The Ohio Machine Tool Co., Kenton, Ohio, had a 36-in. shaper in operation and the Universal Machine & Tool Company, Canton, Ohio, exhibited its 26-in. open-side shaper.

A special heavy-duty draw-cut railroad shaper with driving-box planing equipment and a 30-in. rod brass shaper were in operation at the space of the Morton Mfg. Co., Muskegon Heights, Mich. Driving box brass planing, and shoe and wedge planing equipment were also exhibited.

The machining of Pilloid locomotive valve gear frames on the No. 32 horizontal boring, drilling and milling machine of the Lucas Machine Tool Co., Cleveland, was demonstrated, the company's 50-ton power forcing press also being shown. The Lehman Machine Co., St. Louis, had a 16-speed, geared-head motor-driven engine lathe in operation and broaching equipment was exhibited by the Lapointe Machine Tool Co., Hudson, Mass.

New items exhibited by the H. B. Underwood Corporation, Philadelphia, included a portable boring bar for reboring air compressor and pump cylinders, and a "special" compound locomotive boring bar for piston valve seats and cylinders. The exhibit included also portable crank pin turning machines, a valve seat rotary planer and other items.

Several Exhibits of Grinders and Saws

Several grinding machine manufacturers were represented. A sectional-wheel guide bar grinder, sec-

tional-wheel chucks and blocks, and motor-driven floor grinder were exhibited by the Bridgeport Safety Emery Wheel Co., Inc., Bridgeport. The Diamond Machine Co., Providence, had a 30-in. face grinder in operation on guide bars and other work, a new wheel dresser mounted on the head and controlled from the operator's position at the rear being a feature emphasized. An 18-in. motor-driven tool grinder was also under power.

A new universal cutter and tool grinder designated as the No. 4 and described elsewhere in this issue was shown by the Gallmeyer & Livingston Co., Grand Rapids, Mich. A Grand Rapids drill grinder, a tap grinder and a Valley City floor grinder also were exhibited. A woodworking band saw and a combination saw bench and jointer were also on view. A 20-in. direct-connected motor-driven disk grinder of Charles H. Besley & Co., Chicago, was in operation, this company exhibiting also abrasive disks, and Besley taps. Grinding and polishing machinery was in operation at the booth of the Production Machine Co., Greenfield, Mass.

The display of sawing machinery and saws was large. A cold saw machine equipped with a sectional interlocking inserted-tooth milling saw was exhibited by Henry Disston & Sons, Inc., Philadelphia, a band saw machine being also in operation, as well as a saw blade grinder. Hack saw machines, metal band saw cut-off and other machines were exhibited by E. C. Atkins & Co., Indianapolis. In addition to band sawing and hack sawing machines, the Armstrong-Blum Mfg. Co., Chicago, exhibited a punch, shear and bending machine. The universal shaping saw and the gap saw of the Peerless Machine Co., Racine, Wis., were on view, and band and other saws were exhibited by the Racine Tool & Machine Co., Racine.

Forging and Boiler Shop Equipment

In forging equipment, the Naze Engineering and Machine Works, Philadelphia, had its No. 3-B motor-driven forging hammer in operation, and the Ajax Mfg. Co., Cleveland, exhibited a working model of its new twin-gearred upsetting forging machine, also its new rocker-type drop lock and samples of forgings. An automatic die sinker of the Keller Mechanical Engineering Corporation, Brooklyn, N. Y., in operation contouring and form cutting, was a center of interest. A universal and radial cutter grinder and flexible shaft grinders were also on view.

A triple gag punching machine, a Gray sheet and plate profiler, washer presses and a 100-ton bushing press, all in operation, were part of the interesting exhibit of the Southwark Foundry & Machine Co., Philadelphia. A model of the company's spring banding machine and scale test car were also shown, a full size scale test car being demonstrated at the track exhibit. A hydraulic forcing and bending press of the Chambersburg Engineering Co., Chambersburg, Pa., was in operation, and also a working model of the company's mounting and demounting wheel press. A working model and samples of work of its pneumatic flanging machine were exhibited by the McCabe Mfg. Co., Lawrence, Mass.

The exhibit of the Buffalo Forge Co., Buffalo, was large, a combination punch, shear and bar cutter, a universal plate slitting shear, punch and bar cutter, and an improved bar cutting machine being demonstrated in operation. Drilling machines, forges, blowers and other products of the company were also shown. A gate shear in operation on $\frac{1}{2}$ x 80 in. plates was shown by Henry Pels & Co., Inc., New York. A combination punch, plate shear, bar angle, tee, beam and channel shear was a feature, as was also a new horizontal bending and straightening machine for beams, channels, angles and tees. A single-ended coping machine for channels and beams, and a triple combined punch, splitting shear, bar, angle and tee cutter were also in operation.

A new reverse taper die head for threading staybolts was a feature of the exhibit of the Landis Machine Co., Waynesboro, Pa., which demonstrated also its Land-Matic dieheads, a $1\frac{1}{2}$ -in. double-head staybolt machine and a 4-in. pipe threading and cutting machine. The Williams Tool Corporation, Erie, showed its new

portable power pipe machine and other units in operation. A new bolt centering, pointing and facing machine equipped with an adjustable cutter head, the adjustment being effected without removing the head, was a feature of the exhibit of the Walter H. Foster Co., New York. A semi-automatic valve finishing machine for repairs on air brake valves, and a bolt turning machine for frame and rod bolts, straight or taper, were also in operation.

The chip crusher of the American Crusher & Machinery Corporation, New York, for reducing long turnings to short shoveling grade thereby increasing the value of the scrap, was demonstrated.

Welding Equipment

Arc welding machines were shown by the General Electric Co., Schenectady, and the Westinghouse Electric & Mfg. Co., East Pittsburgh, both of which companies had large exhibits of a wide variety of electrical equipment. Flue welders were shown by the Thomson Electric Welding Co., Lynn, Mass. The Electric Arc Cutting & Welding Co., Newark, N. J., exhibited a new model vertical type Alternarc welding machine for any power supply, a combination cutting and welding machine, and the Alternarc rivet and car scrap cutting machine. A new double carbon handle, which holds an arc between two carbons with a projected flame permitting, it is claimed, most of the work accomplished by the gas flame to be done by the electric arc, with savings in cost, was shown. Another new item was the Taperod, a tapered welding rod.

Gas welding equipment including generators, welding and cutting torches and other items were exhibited by the Air Reduction Sales Co., New York; Carbo-Oxygen Co., Pittsburgh; K-G Welding & Cutting Co., Inc., N. Y.; Alexander Milburn Co., Baltimore, and the Torchweld Equipment Co., Chicago. Material and apparatus for locomotive and other welding were exhibited by the Metal & Thermit Corporation, New York.

Large Exhibits of Pneumatic Tools

Among numerous exhibits of pneumatic tools the Ingersoll-Rand Co., New York, had a large air compressor equipped with five-step control under power. A demonstration of the company's CCS staybolt tapping machine was a center of interest. A variety of other material including riveting, chipping and scaling hammers, pneumatic drills, portable grinders and pneumatic motor hoists were also shown. Two new electric tools including a quick change interchangeable drill and reversible electric tapping machine were shown by the Independent Pneumatic Tool Co., Chicago, and a wide variety of pneumatic tools.

The exhibit of the Cleveland Pneumatic Tool Co., Cleveland, was large, and included a variety of pneumatic hammers, drills and Cleco pressure seated air valves. A new 36 Red Giant air drill was a feature at the booth of the Chicago Pneumatic Tool Co., New York. Riveting and chipping hammers, staybolt riveters and rivet busters were among the several other items shown.

Chipping hammers, drills and other pneumatic tools were on view at the separate exhibits of the George Oldham & Son Co., Baltimore; the King Pneumatic Tool Co., Chicago, and William H. Keller, Inc., Grand Haven, Mich. The rivet cutting gun of the Rivet Cutting Gun Co., Cincinnati, was exhibited and The Hanna Engineering Works, Chicago, had a large model showing the working of its pneumatic compression yoke riveters.

Small Tools and Gages

A wide variety of small tools was to be seen. Twist drills were exhibited by Cleveland Twist Drill Co., Cleveland, which demonstrated a $1\frac{1}{4}$ -in. Cle-Forge drill, operating in cast iron at the rate of 24 in. per min. and 10 in. per min. in machinery steel. Tests were also made in chrome nickel, and manganese steel, the drilling machine used being of special design and equipped with a 70-hp. motor. Another machine, regularly driven by 3-hp., was equipped with a 40-hp. motor and used in demonstrating the company's Peerless reamers.

The strength of Mezzo drills was demonstrated in a portable drilling machine.

Helical inserted-tooth slabbing cutters, gang cutters for shoes and wedges were among the exhibits of the Ingersoll Milling Machine Co., Rockford, Ill., which showed also moving pictures of the application of Ingersoll milling machines. A variety of railroad and standard milling cutters and reamers were exhibited by the Goddard & Goddard Co., Inc., Detroit. High-speed drills, reamers and track bits were on view at the booth of the Latrobe Tool Co., Latrobe, Pa.

A feature of the exhibit of the Davis Boring Tool Co., Inc., St. Louis, was an improved block type reamer, in which a hollow type set screw is employed for making adjustments. Expansion boring tools and a variety of reamers were also on view. Several types of stay-bolt taps and reamers, including a flexible staybolt tap and flexible reamer were exhibited by W. L. Brubaker Bros. Co., New York.

Turning tools, planer and shaper tools were among the items shown by the Shroeder Tool Co., Altoona, Pa., lathe planer, shaper, boring mill, tools and inserted tooth milling cutters being shown by the O. K. Tool Co., Shelton, Conn. High speed steel ground taps, hobs and thread rolling dies, and internal micrometers and Bath

indicators were displayed by John Bath & Co., Inc., Worcester.

Machinery for Handling Material

Industrial trucks, tractors and trailers, electric and chain hoists and other material handling equipment were exhibited by several companies. Storage battery trucks, elevating platform trucks and crane trucks were shown by the Automatic Transportation Co., Buffalo, the Baker R & L Co., Cleveland, and the Elwell-Parker Electric Co., Cleveland. The Yale & Towne Mfg. Co., Stamford, in addition to a variety of trucks, exhibited chain hoists and I-beam trolleys. Chain hoists, I-beam trolleys and electric hoists were on view at the booth of the Chisholm-Moore Mfg. Co., Cleveland, chain hoists and trolleys being also shown by the Wright Mfg. Co., Lisbon, Ohio. Gasoline lift trucks and tractors were exhibited by the Clark Tractor Co., Buchanan, Mich.

The new portable car hoist of the Whiting Corporation, Harvey, Ill., was a feature, a model of its electric crane trolley and locomotive jack being also shown. In addition to electric hoists, the Link-Belt Co., Chicago, exhibited silent and roller chain. There were a few large exhibits of jacks, the Duff Mfg. Co., Pittsburgh, having on view new track automatic lowering jacks and its new type car jacks and coupler jacks.

ENGINEERS MEET AT WINDSOR

Green Mountain Section of the American Society of Mechanical Engineers Enjoys Banquet

On Friday evening, June 6, at Windsor, Vt., a banquet was enjoyed by representatives of the American Society of Mechanical Engineers who live in Vermont and in the western part of New Hampshire. The occasion was the second meeting of the so-called Green Mountain section of the national engineering society, which section was organized at Windsor last fall during a joint meeting with the Vermont Society of Engineers. The largest delegations came from Springfield, Vt., and Claremont, N. H., which, on account of their manufacturing interests, naturally contribute heavily to the membership of the society.

Prof. Edward Robinson, head of the department of mechanical engineering at the University of Vermont, and chairman of the Green Mountain section, presided. The following officers were elected for the coming year:

Chairman, Guy Hubbard, Windsor, Vt., mechanical engineer, National Acme Co.

Vice-Chairman, Frederick Holdsworth, Claremont, N. H., compressor department, Sullivan Machinery Co.

Secretary and Treasurer, Daniel H. Parker, Windsor, Vt., purchasing agent, National Acme Co.

Executive Committee: Edward Robinson, Burlington, Vt.; Henry C. Belcher, Proctor, Vt., and Joseph B. Johnson, Springfield, Vt.

Prof. Emeritus Lester P. Breckenridge of the Sheffield Scientific School, Yale University, a teacher of mechanical engineering for 45 years, and now a resident of North Ferrisburg, Vt., spoke on "What the Mechanical Engineer Can Do for Vermont." He is convinced that in that part of the country power will not flow from a huge central station to the ends of outlying arms, but will rather be fed into the outlying arms by small automatic power plants on mountain streams and will flow to the central station, from which it will be distributed to points where excess of power does not exist.

Ex-Governor James Hartness of Vermont gave his views on what the Green Mountain section might do. Other speakers were Ralph E. Flanders, general manager, Jones & Lamson Machine Co., Springfield, and Henri A. Sévigné, general manager, National Bread Wrapping Machine Co., Nashua, N. H. A report on the spring meeting of the American Society of Mechanical Engineers, held at Cleveland, was presented by Guy Hubbard.

On Saturday morning a number were guests of the Sullivan Machinery Co. at an inspection of the plant

in Claremont, and at a luncheon served at the Hotel Moody. Mr. Holdsworth, chief engineer of the company, was the host.

New England Foundrymen's Association

The June meeting of the New England Foundrymen's Association, held Thursday, the twelfth, took the form of an outing at the Ould Newburg Golf Club, South Byfield, Mass. Most of the fifty members and guests attending enjoyed golf during the afternoon. Norman Russel, president of the association, was chairman of the committee of arrangements. R. B. Wallace, Bethlehem Steel Co., was in charge of golf arrangements, and Charles A. Reed, Read, Fears & Miller, Inc., in charge of the indoor entertainment.

The association will be the guest of the Providence Gas Co., Providence, R. I., Wednesday, Aug. 20. There will be a brief inspection of the gas company's plant and a sail down the bay to Newport, where a visit will be made to the Torpedo Base and Naval Training Stations. In the evening there will be a banquet and entertainment at the Biltmore Hotel.

An invitation has been extended by the association to members of the Philadelphia Foundrymen's Association, Inc., to be guests at the July 18 meeting in Boston. It is planned to visit a number of foundries in greater Boston and Lynn, and to give the Philadelphians a sail down Boston Harbor.

Changes in Bureau of Mines

WASHINGTON, June 17.—Under an order approved by the Secretary of the Interior, a number of changes have been made in the technical division and offices of the Bureau of Mines. The division of metallurgy has been put under the direction of the chief metallurgist, who will have administrative charge of the field studies now being conducted at Miami, Okla., Moscow, Idaho, at the Massachusetts Institute of Technology and at the Bureau of Standards; together with the cooperative studies on oxygen enrichment of air blasts. George S. Rice, chief mining engineer, has been relieved of most of his administrative duties and will serve as advisor to the director and assistant director on mining matters with such special duties as may be assigned to him from time to time. For the present, he will be in entire charge of matters relating to cooperation with the British Government in studies of safety in mines. The division of war mineral supplies has been abolished and its duties, records and personnel have been transferred to the division of mine research.

Increased Interest Promised in Exports

WASHINGTON, June 17.—Scrupulous avoidance of grave blunders which characterized the export effort in the recent past, when conditions somewhat similar to the present prevailed, was urged by Dr. Julius Klein, director of the bureau of foreign and domestic commerce, in an address on Wednesday evening of last week before the National Credit Men's Association Convention in Buffalo.

Speaking on "The Foundation of Exports," Dr. Klein pointed out that during the domestic slump of 1907-1908 most strenuous efforts were made by American export merchants, especially in certain South American markets. An excellent reputation was established for fair dealing and prompt service, it was stated, but with the return of better business there was an immediate recession, a withdrawal of agencies, refusal to fulfill orders, and an almost immediate accumulation of the bitterest ill will.

Never before in the history of the country, he also said, has there been such widespread and persistent interest in export. Demands being received by the Department of Commerce for information on foreign conditions now exceed 5000 a day as against about 800 in 1920. Dr. Klein attributed this increased demand to a number of causes, including the present lapse in domestic activity, the hope of factory owners of full capacity activities in their war-expanded plants and to the recent stimulated demand from America's best customer, Europe, whose purchasing power, it was stated, is already feeling the stimulus of improved fiscal and political conditions.

Reference to Industrial Standards in Advertising Matter

As a definition of policy in the use of references in advertising matter to its approved standards, the American Engineering Standards Committee has issued the following:

Resolved that, in the opinion of the American Engineering Standards Committee, the use, in the advertising of products which comply with specifications and other standards approved by the committee, of proper references to such standards is advantageous and makes for industrial economy; accordingly the committee desires to encourage the use of such references in trade catalogs and other advertising media, but the committee will in no case pass upon the merit of products, or upon their compliance with specifications or other standards, which questions it will leave to the commercial and legal agencies equipped for such work.

Extensive use of such references is made by foreign manufacturers in advertising products made in accordance with the standards of their national standardizing bodies, particularly in Great Britain and Germany. Both the British and Canadian associations have adopted official trademarks for use on goods manufactured in accordance with their specifications.

Hand-to-Mouth Buying Temporary

In its review of the pig iron market for the week ended June 14, the Matthew Addy Co., Cincinnati, says:

"There has been a great deal of careless talk recently regarding the hand-to-mouth market. Predictions are made that there has been a profound change in the attitude of the consumer and that his permanent policy hereafter will be to buy from day to day just as he may need raw materials—he will run to the grocery store every time the sugar bowl is to be filled.

"All this talk is foolish. The consumer will always consult his own selfish interest in regard to buying. On a falling market such as we have had for six months he will buy only as necessity compels, as he knows pretty well that the next time he buys the price will be less. So why load up? But when the consumer feels that prices are on bottom and he scents a revival in business, then he will do just as he has always done—buy for delivery as far ahead as the guileless iron master will sell. And this hand-to-mouth buying

will continue just so long as the present disturbed and contracted condition of business continues. When affairs are stabilized and when industry expands, hand-to-mouth buying immediately will go out of fashion for the simple reason that it will cease to be profitable."

Third Report on Fatigue of Metals

The third report of the progress of an investigation of the fatigue of metals carried on at the University of Illinois in cooperation with the National Research Council, Engineering Foundation, and several manufacturing firms is contained in Bulletin No. 142 of the Engineering Experiment Station of the University of Illinois. This report covers tests with two nickel steels, ingot iron, steels containing 0.045 to 1.20 per cent carbon, copper, brass, bronze, and monel metal. Steel that had already been subjected to ten million or more cycles of stress at or near the endurance limit was retested to determine the effect of the original stressing. Tests were also made to determine the effect on the static strength and ductility of steel of ten million cycles of reversed axial stress at or near the original endurance limit; on the length of "life" of steel of stressing above the endurance limit; and on the endurance limit of over-stressing and subsequent heat treating. Chemical analyses, static and impact tests were also made and hardness was measured. Additional evidence of the existence of an endurance limit for wrought ferrous metals was secured. As the result of experimental study made at the laboratory of this investigation as well as at other laboratories, an extension and modification of the well-known theory that fatigue failures in metal start from slip planes within the crystalline grains is presented in this bulletin. Copies of Bulletin No. 142 may be obtained without charge by addressing the Engineering Experiment Station, Urbana, Ill.

Pan-American Industrial Standardization

Important commercial, technical and trade associations in this country interested in Latin American commerce were represented at a conference on Pan-American standardization in Boston on June 3. The conference, called on the request of the Inter-American High Commission and the United States Department of Commerce, under the auspices of the American Engineering Standards Committee, was to enable American industries to arrange for participation in the Pan-American Congress on Standardization, to be held in Lima, Peru, next November, and to give an opportunity to technical industries of this country to formulate a general policy toward the undertaking.

A message from Herbert Hoover, Secretary of Commerce and President of the American section of the Inter-American High Commission, outlined the preliminary plans already made for the Lima conference. Proposals looking toward standardization between the republics of North and South America have been submitted many times, most of such propositions coming from the governments of the Latin American republics. The Department of Commerce and the High Commission already had preparations well under way for the discussion of classification or standardization of several important raw materials, such as cocoa, coffee, rubber, sugar, cotton and tobacco.

Technical Matters

P. G. Agnew, secretary of the American Engineering Standards Committee, outlined industrial standardization on a national scale as it has developed in sixteen of the leading industrial countries, and the present status of international cooperation in such work.

Approval was given to a preliminary report on the proposed plan of publishing an English, Spanish and Portuguese glossary of technical terms, which had been prepared by M. H. Bletz of the Department of Commerce, W. H. Stratton of the United States Steel Products Co., and John Abbink of the McGraw-Hill Co.

Steel Corporation Operations Charted

Net Earnings Are Becoming Relatively Less as Taxes and
Wages Heavily Increase—Distribution
of the Net Earnings

BY SIDNEY G. KOON

PUBLICATION of the 1923 annual report of the United States Steel Corporation* makes possible an analysis of some of the operative features of the corporation's history. In the diagram (Fig. 1) is shown the distribution year by year, over the period of 22 years, of each dollar which the corporation received in return for its products sold to outsiders. This amount expended for wages and salaries is shown at the bottom of the diagram and measured by the figures at the left. The amount reported year by year as net earnings is shown at the top of the diagram and measured by the figures at the right. The intermediate space represents the cost of materials, repairs, maintenance and all manufacturing and other expenses and taxes, with the sole exception of the wages and salaries included at the bottom.

As the diagram is worked out on the basis of cents for each dollar of gross sales, it follows that it represents also a history of the percentages of the various items studied.

Steady Increase in Wage Payments

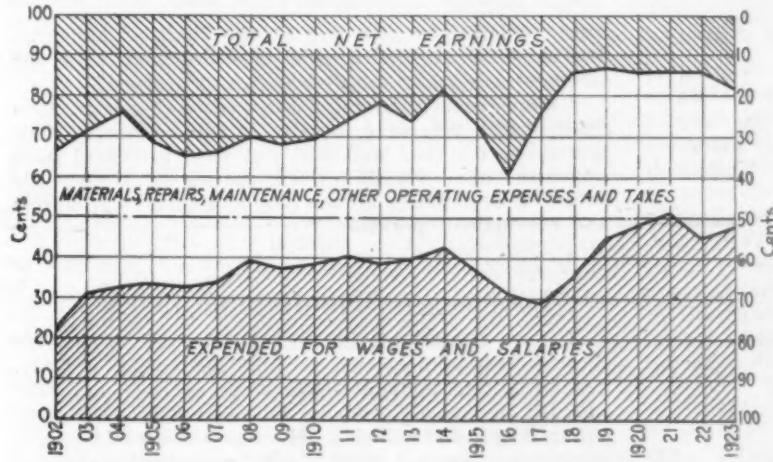
It will be noted that there was a gradual increase, occasionally interrupted, in the proportion of the sales represented by wages and salaries from the beginning up through 1914. As the war orders from Europe began

to grow by leaps and bounds and the corporation's earnings to increase in an even higher ratio, the proportion expended for wages and salaries dropped off during 1915, 1916 and part of 1917. Only when the United States Government acted to stabilize prices in the steel industry did that industry get away from the boom conditions of the early war years and the previous movement get again into action.

So far as the wages were concerned the years 1918 and 1919 made up all of the loss of the three preceding years and this movement continued until in 1921 the payments to employees reached 50.8 per cent of the entire gross sales. Of course, this large proportion was accounted for in part by the business slump of that year, which resulted in the most severe curtailment with respect to productive capacity which the industry has ever known. Wages continued to be paid to great numbers of men in the face of sharply descending business and disappearing profits.

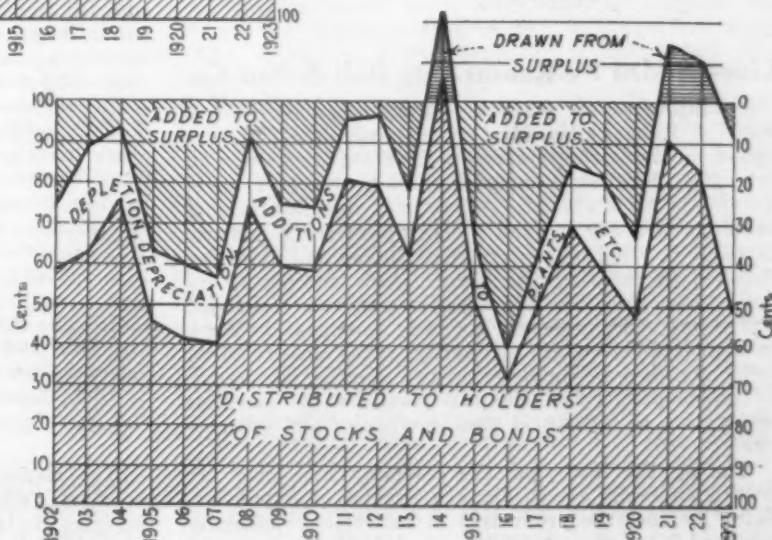
Compared, however, with about 33 per cent—the wage average to the total sales in 1903 to 1907 inclusive—we have in 1919 to 1923 inclusive a wage average of about 47 per cent of the total sales. This means that the workers took a 42 per cent larger toll from each average dollar of sales in the five post-war years than in the five earlier years just quoted. This idea was brought out, in a different form, in an editorial on page 1298 of THE IRON AGE for May 1, in which it was shown

*See THE IRON AGE, March 27, page 937.



At Right Is Plotted the Disposition From 1902 to 1923 of the Net Earnings of the Corporation. Stockholders and bond holders have taken, on the average, 57½ per cent Additions to surplus were made in each year except 1914, 1921 and 1922.

At Left Is Shown the History of Disposition of the Returns From Gross Sales (to Outsiders) of the United States Steel Corporation. The proportion expended for wages and salaries has shown a steady trend upward—from one-third, 20 years ago, to one-half today. Net earnings have decreased correspondingly



that, while wages and earnings were about equal in the early years, wages were three times the earnings in 1919-23.

Changes in Net Earnings

Reference to Fig. 1 will show that at no period in the history of the corporation, until 1914, were the net earnings less than 21 per cent of the gross sales. The diagram shows also, however, that at no period within the six most recent years did the net earnings reach 19 per cent, while in 1918 to 1922 inclusive the average was only 14.1 per cent. The huge earnings of 1916 brought the figure temporarily to 39 per cent of the total sales—the only instance since 1910 when 30 per cent has been even approached.

But it must not be supposed that these net earnings are wholly consumed in payments to capital. In only one year (1914) of the 22 has this been the case. In six years, including 1923, less than half the net earnings was distributed as bond interest and dividend payments—in 1916, only 31.3 per cent. For the whole period it has averaged 57.5 per cent. The rest has been "plowed back into the business"—put into new plant and modernization of old—added to the earning capacity of the property.

In Fig. 2 is given a picture of the disposition of the net earnings year by year from 1902 to 1923 inclusive. This shows that the total payments to holders of stocks and bonds of the corporation have fluctuated about the 50 per cent line, having been above it on 16 occasions and below it on 6. In the one bad year, 1914, they exceeded the net earnings, while in 1921 and 1922 they were such large proportions of net earnings as to require the corporation to draw from the surplus in making provision for depreciation, etc. In all other years, including those in which business was not satisfactory, something was added to surplus each year, the smallest of such additions having been in 1911 and 1912.

As with the other diagram, Fig. 2 does not represent the amount (in dollars) distributed to capital or added

to surplus year by year. It is a story of the percentage of the total earnings so used, and may be considered as the number of cents per dollar of earnings distributed and otherwise disposed of.

Materials and manufacturing and other expenses and taxes (Fig. 1) had a fairly uniform history up to the time the United States entered the war. From that time on they have taken an increased toll, due primarily to the heavy tax burden of the past seven years—a burden which made itself sharply manifest on the diagram in 1917 and has continued ever since.

How Dividends Continue to Be Earned

With the much reduced (relative) surplus of revenue available for distribution on the stock of the corporation, which has prevailed during this era of high taxes and high wages, it is evident that only the most careful supervision over the corporation's affairs can maintain a rate of earning consistent with the requirements of the bond interest and dividend payments. Primarily a continuance of satisfactory earnings for these purposes is based upon a continuance of high productivity, year after year. The gross sales in the five pre-war years, 1903 to 1907, averaged about \$400,000,000 per year. Compared with this the gross sales for the five years since the armistice have averaged about \$930,000,000, while the capitalization has remained substantially unaltered.

From this it follows that net earnings of 14 per cent on sales of \$930,000,000 are equally effective, in payment of capital charges, with the earlier net earnings of 30 per cent or more on sales of \$400,000,000. Had additional capital obligations been issued as the capacity of the corporation for producing steel products increased this would not be true. Only by building, out of earnings, such a plant as that at Gary and increasing the capacity at numerous other plants has the corporation maintained its ability to pay satisfactory returns upon its capitalization out of continually reduced net earning percentages.

Preparing for Trade Extension in Sheets

The June meeting of the National Association of Sheet and Tin Plate Manufacturers, held at the Maketeweh Country Club, Cincinnati, June 10, was largely taken up with preparing plans for the trade extension program adopted at the annual meeting at White Sulphur Springs. The morning session was devoted to business discussions, and in the afternoon the members engaged in a blind bogey golf match, Calvin Verity winning first prize. Other prize winners were Charles Watson, C. R. Hook, and Charles Chase. The members of the association were the guests of the Newport Rolling Mill, Newport, Ky., during the day and evening, Frank A. Moeschl, general manager of sales, having charge of the arrangements for the meeting.

Lines Added by Kansas City Bolt & Nut Co.

Additions to the plant of the Kansas City Bolt & Nut Co., Kansas City, Mo., recently completed, are expected to enable the company to increase production 50 per cent. New units added include a structural steel warehouse, 80 x 456 ft.; a structural steel fabricating building, 65 x 160 ft., and a scrap yard crane runway 65 x 360 ft. Old mills were re-arranged and new ones installed in refitting the plant. New equipment includes iron and rail furnaces, two electric overhead cranes and semi-automatic hot beds and shears. Work on improvements which ordinarily would have required eight months was completed in two months, due partly to the company's facilities and partly to the excellent cooperation of structural steel companies and contractors.

During the last year the company has gone far toward effecting a well-planned system of expansion, which includes the production of rail steel reinforcing bars and later the establishment of facilities for making steel fence posts for industrial and agricultural

uses. Operations now are at the limit of capacity. President W. L. Allen said in connection with the changes:

"We have kept in mind the practical side of production with reference to sales in this territory. The mill rolls rail steel and will roll steel merchant bars and iron bars. Flexibility will permit us to keep the mills nearer capacity all the time and assures profitable and economical operation."

Locomotives Manufactured in 1923

Census figures of the manufacture of locomotives showed 19 establishments in 1923 against 22 in 1921. The 1923 data include 30,672 wage earners and 2936 salaried employees, receiving an aggregate of \$58,654,091 in wages and salaries. Horsepower used in manufacture aggregated 91,884, coal consumption having been 431,115 net tons.

Locomotives were produced to the extent of \$177,891,022, which amount is increased by repair work, spare parts and other products to a total of \$215,392,951. The cost of materials amounted to \$124,261,528, leaving a value added by manufacture amounting to \$91,131,423.

Locomotives made numbered 3422, compared with 1680 in 1921, thus showing an increase of 103.7 per cent. The increase in salaries and wages was 139 per cent, while the increase in the value added by manufacture was 95.5 per cent. Seven of the nineteen establishments are located in Pennsylvania, the others being in Ohio, Georgia, New York, Virginia, Illinois, Iowa and New Jersey.

The Hendey Machine Co., Torrington, Conn., will move its Chicago headquarters July 1 to Suite 200-3 Sharples Building, corner of West Washington Boulevard and Jefferson Street, where it will have a combination office and permanent exhibition.

Steel Metallurgy of the British Empire

Features of the British, Canadian and Indian Industries Presented at British Exposition—Modern Blast Furnaces, Alloy and Special Steels—Coke Oven Practice

(*Special Correspondence*)

LONDON, June 5.—Many engineering conferences have been arranged to be held at Wembley during the period of the British Empire Exhibition; one is being held during the present week at which mining engineers and metallurgists drawn from all parts of the Empire are discussing the scientific, technical, and economic problems connected with the development of the mineral resources of the Empire, and the mining and metallurgical industries.

The congress was divided into four sections: (A) Mining; (B) petroleum; (C) metallurgy of iron and steel, (D) non-ferrous metallurgy. The inaugural address was delivered by the president, Viscount Long, a former cabinet minister, who of recent years, and since his retirement from the cabinet, has devoted his main energies toward the advocacy of trade development within the British Empire.

In his address, Viscount Long surveyed the mineral resources and discussed their relation to the prosperity and development of the Empire. The purport of the address was to show that for all practical purposes the British Empire, if treated as a single unit for trade, could be rendered independent of countries outside the Empire for essential raw materials required by the iron and steel industry. This same doctrine was expounded by different speakers at various stages of the congress, while the system of preferential customs dues found many advocates. We give below extracts from some of the iron and steel papers presented before the congress:

British Iron and Steel Industry

F. W. Harbord and E. F. Law, in their paper, "British Iron and Steel Industry," review the advances made during the last 70 years. Like all pioneers, they claim that British industry is still suffering from the competition of other countries which have profited by British experience. The general tendency, both in blast furnace and steel works, has been to increase the size of each unit. Owing to the variety of ores dealt with, and to other conditions, the large American type of blast furnace is not suitable for all districts.

A furnace of entirely new design holding 300 tons of metal, originally intended for use as a mixer, is being tried experimentally in the Middlesbrough district as a steel furnace, and, if successful, furnaces up to 500 tons may ultimately be built; the maximum size, however, which will prove most economical under varying conditions, will depend very largely upon the total output of the works and the saving in labor and fuel and the increased output in relation to capital cost which can be effected. Until these have been determined, no opinion can be expressed on this point.

The British iron and steel industry, say the authors, is suffering from the depletion or exhaustion of its local supplies of iron ore, but there still remain very large supplies of low-grade phosphoric ores within easy access of most of the principal steel districts. Some of the largest steel producers in the Cleveland district still have large reserves of the local ores sufficient to last for many years.

Economic Considerations Affecting the Steel Industry

In a paper with the above title, describing the present stage of development and the effect of war demands upon the British iron and steel industry, Sir W. J. Larke and M. S. Birkett indicate some of the ways in which the Dominions can assist in the encouragement of the British industry. The most obvious course is

that of according a preference as regards customs duties on imports of iron and steel from Great Britain, and this preference is given in most cases. But there are other and less obvious ways in which the assistance may be given, the two chief of which are the insistence of equally stringent tests being applied to material offered from other sources at lower prices than British steel as is applied to material supplied from Great Britain, and, secondly, that as far as possible the clauses insisting on fair wages and conditions of labor shall be as strictly applied to imports from the Continent as to imports from Great Britain.

The authors are of opinion that the full force of America's competition has not yet been felt in the overseas market, and they have little doubt that in times of restricted home demand America will endeavor to dispose of her surplus output in the export market and compete with the exports of Great Britain. In the five years preceding the war the Dominions took 9,760,000 tons of iron and steel; in the five post-war years they have taken only 6,849,000 tons, and while the British iron and steel industry is watching with interest the efforts of many of the Dominions to create an iron and steel industry of their own, they anticipate that the development of the Dominions will be sufficiently rapid to absorb not only the home production, but also an increased import from the mother country.

Canadian Iron and Steel

A very encouraging survey of the iron and steel industry in Canada was given by Charles S. Cameron, secretary British Empire Steel Corporation, Ltd., who confined attention in his paper, "The Iron and Steel Industry of Canada," to fundamental processes, the smelting of ore and the production of the primary forms of steel, and those made directly from them. Mr. Cameron traced the growth of the industry, as it now exists in Eastern Canada, from two metal workers, Fraser and Mackay, who, in 1872, founded in the village of New Glasgow, Nova Scotia, a modest forging plant, which they called the Hope Iron Works, whose capital did not exceed \$4,000. From these modest beginnings grew the company of which Mr. Cameron is secretary, with over \$91,000,000 capital stock issued and nearly \$93,000,000 of bonds and debenture stocks. Although the industry never made any material progress in Quebec, Mr. Cameron believes that this province may again become an active producer of iron when the water-power resources are developed.

The works on the lower Lakes at Hamilton on Lake Ontario owned by the Steel Company of Canada, Ltd., have a possible annual output of about 320,000 tons of steel ingots and a quantity of pig iron in excess of their own requirements. The whole of the ore and coal required for their operation is imported by water from the United States. After surveying other works of various sizes and importance, Mr. Cameron points out that the output of primary forms of iron and steel in Canada has rarely reached the maximum quantities for which the works were designed. The largest output was attained in the year 1918, when 1,195,551 tons of pig iron and 1,873,708 tons of steel ingots and castings were made.

Mr. Cameron takes the trade for the year ending March 31, 1923, as an index of the average that may be expected in the near future. The value of iron and iron products imported in that year was approximately

(Continued on page 1833)

Work-Hardening of Various Metals

Measuring the Extent of the Progressive Change with a British Pendulum Hardness Tester

BY EDWARD G. HERBERT*

IT is well known that most metals are hardened by being worked. It is also well known that the hardness thus produced offers great resistance to further working of the material, but has a relatively small effect on hardness measurements such as the Brinell which depend on simple indentation.

Recent researches with the Herbert pendulum hardness tester have thrown additional light on the subject of work-hardening. This instrument consists of an arched weight (usually 4 kg.) supported on a ball 1

The procedure in making work-hardening tests is as follows: The pendulum is placed on the specimen in a tilted position with the bubble at zero on the scale. It is released and the scale reading taken, and the instrument is then tilted over by hand, without removing it from the specimen, until the bubble is at 100 and again released. The pendulum swings back, the ball rolling in the work-hardened groove formed by the previous rolling, and a second reading is taken. The swing is continued by hand until the bubble is at zero and the instrument again released, the ball rolling in a groove that has been work-hardened by two successive rollings, and so on until no further work-hardening is shown by the readings.

Fig. 1 shows results of work-hardening tests on a range of materials. Commencing at the top, glass is seen to be entirely without work-hardening capacity. It gives a repeated reading of 97 irrespective of the number of previous rollings and this is not because the glass is too hard to be indented. A very perceptible indentation is made by the test.

Manganese steel in its natural state gives the very low reading 15, corresponding to that of good mild steel, but a single passage of the ball raises its hardness to 83 which is increased after the third pass to 95, equivalent to the hardness of hard tool steel. Successive swings of the pendulum give alternately high and low readings, and this zigzag

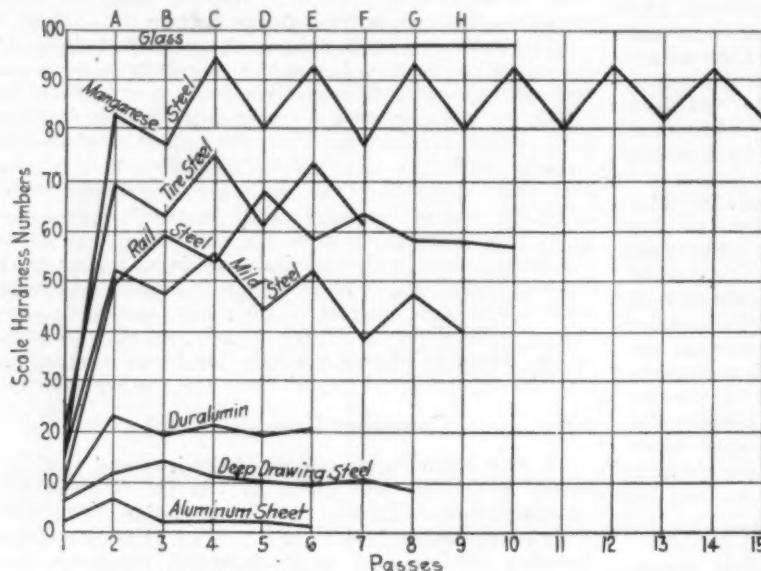


Fig. 1—Work-Hardening Tests on Several Materials Showing Results with a Pendulum Tester

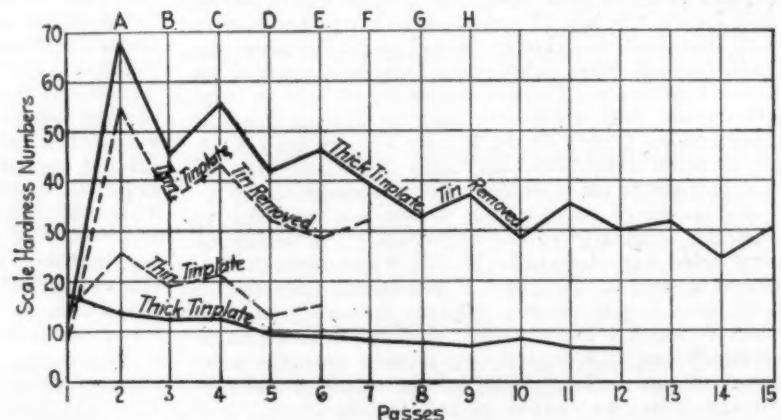


Fig. 2—Work-Hardening Tests on a Piece of Tin Plate

mm. in diameter, and surmounted by a curved spirit tube and scale. The center of gravity of the instrument is 0.1 mm. below the center of the ball.

Of the two tests made with the pendulum the time test (the time of swing measured with a stop watch) measures indentation hardness corresponding with the Brinell. The scale test (the amplitude of swing from a tilted position shown by the bubble and scale) was known to indicate the resistance of a material to working with a tool.

An important new development of this test enables it to measure also the work-hardening properties of materials, the test depending on the fact that the material on which the ball rolls in making a test is work-hardened by that rolling.

effect, apparent in most of the curves, is probably due to the path rolled by the ball being slightly deeper at one end. The ball is rolling up and down a slight incline.

Results on Rail Steel

The rail steel shows a more gradual work-hardening than most of the other specimens, the maximum reading of 68 being obtained on the fourth pass. It may be surmised that work-hardening plays a more important and useful role in rail steel than in any other material. The repeated passage of the rolling stock over the rail produces a hard, wear resisting skin, while the body of the rail retains the toughness necessary to resist shocks. Whether adequate attention has been given to this feature is a question for railroad engineers to answer. The existence of an apparatus capable of

*President Edward G. Herbert, Ltd., Manchester, England.

measuring work-hardening in a test occupying only a few seconds, and applicable to the actual rail without any special preparation, should certainly facilitate investigation.

Duralumin shows its maximum work-hardening after a single pass, and a special sheet steel for deep stamping a very low maximum after two passes.

The curve given by this material, which is known to

the specimen is therefore an increasing one and the resistance to rolling increases with it.

A further test was made on an adjacent spot on the same piece of tin plate from which the coating of tin had been scraped away. The result of removing the tin was striking. The first scale reading declined from 17 to 12 and a single passage of the ball increased the hardness to 66. A similar but less marked result, shown by broken lines in Fig. 2, was given by another piece of tin plate 0.0055 in. thick.

What inference is to be drawn from these results? It might appear that the test was so superficial as to indicate merely the difference of properties of two different metals, tin and steel, but this is certainly not the case. The indentation hardness of these specimens, as measured by the pendulum time test, was almost identical on the tinned and scraped surfaces; it was the hardness of steel, not tin. Does the tin coating actually prevent work-hardening? It is known that the process of rolling lead into foil is greatly facilitated by depositing a thin coating of tin on the lead. Has the coating of tin on tin plate a similar beneficial effect on its working properties, and if so should not all sheets intended for deep stamping be tin coated? The experience of the present writer does not enable him to answer these questions.

The curves in Fig. 3 show work-hardening tests on non-ferrous metals, and do not call for special comment.

For purposes of specification it will be necessary to have a convenient notation for expressing the results of work-hardening tests with the pendulum. Such notation should indicate not only the amount of work-hardening but the rapidity with which it takes place. It is suggested that work-hardening should be measured by the difference between the first scale reading and the highest scale reading, and that the rapidity of hardening should be indicated by letters of the alphabet applied to each successive passage of the ball after the first. Thus the tire steel in Fig. 1 gave an initial reading of 20 and a maximum reading of 75 after the third pass. The work-hardening properties of this steel would be designated C55.

The following work-hardening numbers were obtained on typical materials, the standard 4-kg. pendulum with 1 mm. steel ball and the 0.1 mm. length of pendulum being used in all cases:

Manganese steel.....	C80	Mild steel	B40
Stainless steel	C67	Admiralty bronze	A22
Rustless iron	C62	Wrought iron	A22
High-speed steel annealed	C59	Duralumin	A15
Rail steel	D58	Yellow brass	B 8.5
Tire steel	C55	Cast copper	B 8
Tinplate detinned	A54	Deep stamping steel	B 8
Semi-steel	D51	Aluminum sheet	A 5.5
Aluminum bronze	A47	Glass	0
Cast iron	B46	Mica	0
		Tin plate	-3.5

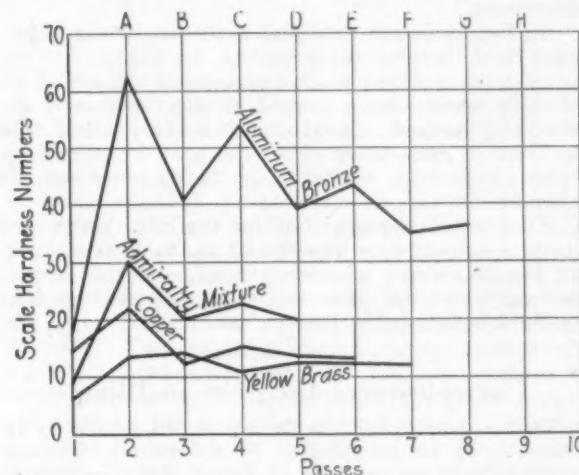


Fig. 3—Work-Hardening Tests on Some Non-Ferrous Metals

be particularly suitable for difficult stamping operations, is suggestive. It is notoriously difficult to distinguish by any tests previously applied between a steel that will stamp easily and one that will crack in the dies. The indentation tests fail entirely in this respect. The pendulum scale test, as previously applied, gives a much better indication, but the curve in Fig. 1 suggests that the principal requisite in sheet metal for difficult stamping may be, not softness nor ductility but the absence of the work-hardening property.

Striking Results on Tin Plate

Further light is thrown on this subject by the curves in Fig. 2. Work-hardening tests were made on a piece of ordinary tin plate, which gave a first scale reading of 17 and showed no work-hardening whatever but a continuous falling off in the hardness numbers. This decline from the maximum does not denote a softening of the material. In the pendulum scale test the specimen is stressed beyond the elastic limit, and there is a deepening of the groove at each successive passage of the ball. The arc of contact between the ball and

"All Metal" House at Wembley Exposition

One of the exhibits in the British Empire Fair at Wembley, a suburb of London, which has attracted a great deal of attention is a house built of metal by Frederick Braby & Co., Ltd., London, from designs by Braxton Sinclair. The building has been erected to house the exhibits of the Braby firm and is made of products of the different works. It has a copper roof, dormer and dome surmounted by a globe. The steel framework is covered with steel panels, with handsome steel and bronze windows set in.

In front is a recessed vestibule two stories high, executed entirely in bronze, with bronze doors and screens and fitted with steel casings with copper panels. The flooring in the building is of steel, with pressed steel ribs covered with composition. There is a novel staircase of pressed steel. The roofing is lined with zinc, while steel lockers and shelving line the walls.

The Pittsburgh Foundrymen's Association will hold its annual outing on the afternoon and evening of Monday, June 23, at "The Pines," Keown Station, Pa. Outdoor sports will be followed by a banquet.

Portland Cement Makes a New Record

Production of Portland cement in May at 13,777,000 bbl. establishes a new monthly record, displacing the 13,350,000 bbl. made last October. Production of the five months of the year to date aggregates 53,249,000 bbl., compared with 50,349,000 bbl. last year, which was a record up to that time.

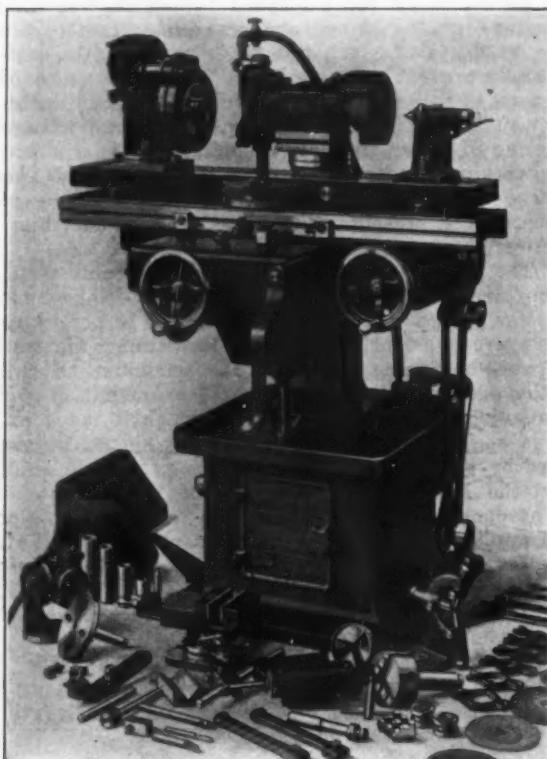
Shipments in May amounted to 14,551,000 bbl., this figure having been exceeded by August of last year with 14,971,000 bbl. Stocks at the end of May are reported at 16,385,000 bbl., or slightly less than at the end of February. Both April and May showed shipments about 1,000,000 bbl. in excess of production, stocks at the end of March having been 18,189,000 bbl.

Mechanical stokers sold by 15 establishments in May numbered 64, with an aggregate of 34,447 hp., according to reports to the Department of Commerce. This is the lowest rating for any month since December and compares with an average of 60,870 hp. in the 12 months of 1923. The figure for April was 47,939 hp., while that for May last year was 100,513 hp., the highest figure in 18 months.

New Universal Tool Room Grinder

A universal tool room grinder equipped with power feed and wet grinding attachment, and having the motor for driving the grinding wheel spindle mounted in the base, eliminating all overhead works, has been placed on the market by the Gallmeyer & Livingston Co., Grand Rapids, Mich. A second motor, mounted in the headstock, is employed for revolving the work for cylindrical, internal and other grinding. The machine, which is designated as the No. 4, is also available with hand feed, belt drive and without the wet grinding attachment.

The longitudinal travel may be controlled from the



Universal Cutter and Tool Grinder. The driving motor is mounted in the base and a motor in the headstock is employed for driving the work. The machine may be equipped for power or hand feed

rear of the table by means of a convenient lever, the transverse and vertical movement being operated also from the rear. Vertical and transverse movement of the table may be also obtained from the front of the table, as well as either slow or rapid action for the longitudinal travel. For wet grinding, the pump, which is mounted on the tank, forces water to the wheel through a large pipe, giving volume without pressure.

For cylindrical grinding, work up to 32 in. long may be held between centers. The longitudinal movement available is 24 in. and the maximum swing is 10½ in. Tapered work may be conveniently ground, and may be measured either in degrees or inches. In reamer grinding the table is swung around to the proper degree or taper per foot, and may be adjusted accurately by using convenient micrometer adjusting screws. For long reamers the hand wheel feed is used; for short reamers the lever is more convenient. An internal grinding attachment equipped with ball bearings is available, and is mounted in the T-slot on the head of the machine and driven by belt to a pulley on the main spindle.

In grinding a hob, the hob is mounted on a mandrel on centers, and the wheel head swung around 90 deg. A saucer wheel is employed and the hob is indexed from the heel of the tooth being ground. To produce a true radial grind it is necessary to have the face of the grinding wheel in line with the centers. In the case of a spiral hob a master form mounted ahead of the hob is employed, a tooth rest being mounted on the head, so as to be stationary and not move with the table.

The face plate with its expanding collar is employed in face grinding and for grinding slitting saws and cutters. Two collars, 1 and 1¼ in. are provided. The headstock is swung around on its graduated base so that its axis is at right angles to the table travel, and either hand or power feed may be used. In the motor-driven machine the work is revolved by the small motor on the headstock, two speeds being provided for this attachment.

On face mills the universal headstock, which is provided with several taper collets, is employed. The swivel block is tilted to give the proper clearance, the grinding wheel swung around 90 deg. so that a cup wheel may be used. The machine may be operated from the front or rear, using either the hand wheel or lever feeds. Face mills up to 18 in. in diameter may be ground.

All gears in the gear box for the table power feed run in a bath of oil. The size of the table is 5½ x 42 in., the transverse movement 9 in., and the vertical movement 10¾ in. The weight of the machine with standard equipment is 1550 lb. net.

Unemployment Increases in Illinois

That unemployment is increasing in Illinois is indicated by a report released by the general advisory board, Illinois Department of Labor, and compiled by R. D. Cahn, chief statistician. Manufacturing employment declined more sharply in May than at any time since 1921, with many mines closed and others closing and with outdoor occupation held back somewhat by continued cool weather. The number of unemployed in the State has become larger than at any time since early fall, 1922. A reduction of 2½ per cent in the number of industrial workers in May was reported by manufacturers who employ more than 40 per cent of the labor in the State. Chicago's unemployment index is the worst since March, 1922.

In the metals, machinery and conveyance group there was curtailment in 10 out of 12 industries. The depression in the mining industry is general and employment declines were also noted in shoe factories, chemical industries, wearing apparel factories, stock yards, and in the wholesale and retail trades. The agricultural implement industry has experienced a drop much larger than the usual seasonal one. Seven and six-tenths per cent of the farm implement workers have been laid off. Building work, on the other hand, is expanding seasonally, and the same is true for confectioners, ice cream and ice manufacturers and tobacco factories.

Coating Wood with Sprayed Metal

In California and other warm climates wood is attacked by white ants, and lead cable sheathing suffers from the cable borer or "short circuit beetle." The latter cuts his way through lead with ease if he can find a suitable fulcrum from which to work. A possible method of keeping him out would be by covering the cable at points likely to be attacked with a coating so hard that he could not bore through it, and the Bureau of Standards believes that spraying a hard metal over the lead may solve the problem. Apparatus similar to that recently developed for the Signal Corps could be used.

Infected wood containing beetles about ready to emerge has been supplied by the Department of Agriculture, and has been sprayed with various metallic coatings to find out whether the beetles can cut through the metal. Sound wood of several species has also been coated and the Department of Agriculture will see whether the beetles can drill through it.

The Interstate Commerce Commission has set July 14 as the date for a hearing at the United States Court rooms in Indianapolis before Examiner Mackley on the proposal of railroads to adjust rates on iron and steel products between points in Illinois, Indiana, and Missouri. Most of the proposed rates call for increases, the specific products affected being bands, bars, boiler plates and rods.

Many Benefits from Cooperative Research*

Steel Founders Research Group Regarded as Innovation When
Formed Four Years Ago—Improved Methods and
Lowered Cost Effected

INDUSTRIAL research is an important factor in maintaining manufacturing efficiency and, therefore, reducing costs of goods produced of a given quality.

Research is being carried on by all progressive concerns, although the performance may not be spoken of as research, or carried on systematically and uninterruptedly. Many companies have research departments as integral parts of their organizations. This plan is limited to the large-scale producers who have the required financial ability to assume the expense involved. The results of their investigations are frequently confined to their own use. This gives the large producer a decided advantage over his smaller competitors, whose limited means hinder them from pursuing the same methods in developing economical manufacturing processes. To offset such an apparent disadvantage to the smaller companies, cooperative industrial research can be carried on by companies in the same industry, with the result that they may even have an advantage over the large producers in that industry, because research promoted in this manner has the stimulus of healthy rivalry, lacking when research is done by the individual company for itself alone. Each concern participating in such cooperative endeavor is in a position to test and practically apply the work of its associates.

Steel Foundries Conduct Cooperative Research

An illustration of cooperative research in an industry is that of the Electric Steel Founders Research Group, the membership of which comprises the Fort Pitt Steel Casting Co., McKeesport, Pa.; Lebanon Steel Foundry, Lebanon, Pa.; Michigan Steel Casting Co., Detroit; Nugent Steel Castings Co., Chicago; and Sivyer Steel Casting Co., Milwaukee. Each of these companies has a separate identity, and there is no joint stock ownership. All of them are competing companies, engaged in the manufacture of miscellaneous steel castings of small and medium weight by the electric furnace process. The combined productive capacity of these five companies in the group represents only about 1½ per cent of the potential capacity of all the steel foundries in the United States.

The formation of this group resulted from the desire on the part of executives in each of the five companies to improve existing manufacturing methods and the quality of their products, thereby reducing production expense and subsequent costs incurred by the consumers. By uniting efforts along research lines, it was appreciated that the work could be carried on more rapidly and at less expense to each company. There was no precedent available to guide these companies, as this type of cooperation was apparently an innovation in American industry. Therefore, it was to some extent a speculative venture, but it had a sound basis in that all of the companies had the same definite objective—mutual respect, similar ideals, and principles of conduct. The scheme has been in effect for four years, and experience has demonstrated the beneficial results from this type of cooperative enterprise, these results being: decreased costs of production, elimination of waste, improvement of processes and of quality of products, and standardization of operations and methods of analysis and control.

The technical investigations of the research group are carried on at the plants of the five companies, and

no central laboratory is maintained. This plan permits conducting researches under practical manufacturing conditions, which is desirable in order that any new developments resulting from experiments can be immediately and closely observed in practice.

Activities of Research Group Outlined

A better understanding of the activities of the research group may be gained by a brief reference to the nature of the business with which this work is concerned. That branch of the steel casting industry, manufacturing miscellaneous castings as distinguished from specialties for railway use, makes castings after orders are received. It does not make castings for stock. Therefore, it differs from some industries in this important respect, and is in that class of industries which require that a demand for their products be created previous to manufacture. The average foundry making small steel castings normally produces in the neighborhood of 40,000 castings a month, and these may be made from 500 or more different patterns, each of which is a problem in itself because the method of producing castings from each pattern has to be studied carefully in order to obtain sound metal sections.

In general, all the castings pass through the same processes in the foundry, each process requiring critical supervision. The making of the steel is a highly important factor. The molding department is the main productive department, and consequently is carefully organized and controlled. Details such as pattern equipment, flask equipment, molding sand, proper size and location of gates and risers, venting molds, molding machines, sand mills, etc., offer fertile fields for study and improvement. In the core department there are such items as core sand, sand mixers, drying-ovens, core-boxes, core machines, etc., to be considered. After molds have been poured and the castings are shaken out of them, the latter are delivered to the cleaning and finishing department, where numerous operations are performed on them.

The members of the group are trying constantly to improve the various operations outlined, by conducting investigations at each plant, under the scrutiny of a resident research engineer. These men are not disturbed by responsibilities for routine production details. The investigations are broadly planned and supervised by the research director of the group, who makes periodic visits to each plant and keeps in close touch by frequent correspondence.

Close Check on Furnace Practice

In making steel for castings, it is highly desirable that it be of uniform chemical composition. Each heat of steel should have amounts of carbon, manganese, silicon, sulphur and phosphorus, lying within prescribed ranges established for good foundry practice. The amounts of sulphur and phosphorus, which are impurities, are kept below definite maximum limits. The percentage of the five elements have been established by the members in the group for governing the composition of the regular grade of steel made at each plant best adapted for general purposes, as determined from extended experience in laboratory and service tests. When the acid electric furnace is used for making steel, skillful furnace practice is required to make successive heats of steel having this uniform chemical composition. Studies of this have been made, and the results have been extremely helpful in making better steel. The control of the composition of the metal is considered so important from the standpoint

*Abstracted from a paper on "Cooperative Research Work," presented by W. J. Corbett, Industrial engineer, Electric Steel Founders Research Group, 541 Diversey Parkway, Chicago, at the eleventh national convention of the Society of Industrial Engineers, held in Buffalo, April 30, May 1 and 2.

of quality and reduction of waste in the form of defective castings that the chemical analysis of every heat made in the plants in the group is sent to the central office, where tabulations and graphic charts are made for each month's performance. Ratings of the plants are calculated by the research director, by using as a basis the extent of the variations and the results that are outside the prescribed ranges. These ratings and graphic charts are then sent to each plant so that results from all the plants can be studied.

Since the making of steel of a desired uniform chemical composition must depend on the accuracy of the chemical analyses, a cooperative means for maintaining and checking the work of the chemists is used. Samples of steel are sent by each plant every month to the central office of the group, where their identity is disguised so that their sources cannot be determined. Part of the sample from each plant is sent to all the plants for chemical analysis. The results of the analyses are then sent to the research director, who rates each plant according to the demonstrated proficiency in the routine work of the chemical laboratory. Such methods of comparison promote a competitive spirit in each plant organization, and inspire the personnel zealously to improve performance and excel the other plants.

Molding Sand Studied

An important investigation undertaken by the research group was that on the subject of molding sand. These researches have furnished valuable information concerning the ingredients to be used for the sand mixtures, the methods of mixing these ingredients, and the routine tests for use in controlling the factors such as moisture that play a very important part in the condition of the sand and the perfection of the castings.

Problems of Management Also Studied

In addition to the consideration of strictly manufacturing problems, cooperative studies have been made of problems of management, such as the principles of cost-finding. By analyzing the methods in use at each plant, it has been possible to select the good points of all the plants and coordinate them into one best plan for doing certain things. Such composite plans are made available to each plant so that they can be put into practice with whatever modifications are necessary to suit the local conditions.

Discussion of Results of Studies Beneficial

The group's investigations performed at each plant are transmitted to the other plants by means of formal reports prepared by the research engineers. Copies of these reports are sent to the chief executive of each company in the group, and are read and discussed at regular meetings of the executives from all the plants. At these meetings a free exchange of ideas takes place concerning the various problems relating to steel foundry practice. This is one of the most beneficial effects of the cooperative work, because it enlarges the perspective and supplements the experience of each participant.

Another feature of the cooperation is the encouragement of visits by executives and foremen to the different plants. The representatives of a plant may at any time visit any of the other plants in the research group to procure first-hand information or to assist in the carrying on of the research work. During such visits they procure information helpful in increasing efficiency at their own plant.

The regular exchange of data pertaining to certain manufacturing operations permits each plant to learn of the performance of all the others with respect to these operations. It furnishes them with a standard or a goal to be reached. The data regularly exchanged consist of only those pertaining to the strictly technical conditions, and they serve to point out possible economies in certain manufacturing departments in the foundry. Systematic comparisons of costs of purely technical operations (to which such data are restricted) frequently suggest specific researches to ascertain the reasons for differing results, leading to changes in shop practices that are more efficient. This

cooperative plan prevents any plant from assuming the "can't be done" attitude, because the information is available to show what is being done along technical lines by the other plants using the same manufacturing processes.

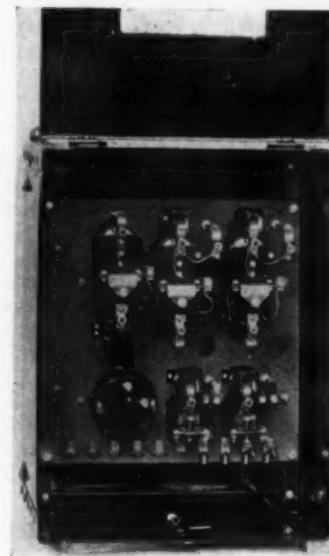
Cooperative Work Improves Morale

A very significant indirect benefit of the cooperative work is the effect on the members of the plant organizations. The enthusiasm of the executives is transmitted to the foremen, who are inspired by the spirit of competition among the plants to make every effort in reducing their production costs consistent with the maintenance of a very high quality. The esprit de corps thus created promotes harmony in the organization and breaks down the barrier between the sales and operating departments. Each unit in the plant organization becomes fully aware of the problems of the other units, and all of them come to the realization that they are working for a common purpose, which can be best attained by hearty cooperation.

New Magnetic Machine-Tool Controllers

One of a new line of magnetic machine tool controllers developed, primarily for application to direct current motors in sizes ranging up to and including 15 hp. and employing the counter-e.m.f. method of acceleration, is shown in the accompanying illustration.

These controllers, which are of General Electric Co. manufacture, are applicable to both reversing and non-reversing, constant and adjustable speed drives requir-



Magnetic Machine Tool Controller for Application to Direct Current Motors Up to and Including 15 Hp. The device is applicable to both reversing and non-reversing constant and adjustable speed drives requiring normal starting conditions

ing normal starting conditions. The device provides two accelerating points; the starting resistor is automatically short-circuited in one step upon proper acceleration of the motor. This is accomplished by an accelerating contactor the closing of which is governed by the counter-e.m.f. of the motor.

Coincident with the adoption of the new type of starter for the company's smaller motors, a complete redesign has been made of its larger types of magnetic machine tool and general purpose controllers.

The fifth edition of the Refractories Manufacturers' Association's "Book of Brands" will be ready for distribution the latter part of June. In addition to a complete list of manufacturers of fire brick in this country and in Canada, it gives an alphabetical list of the brands and trademarks used in the industry. The manufacturers' names are grouped by States, which makes it a convenient reference book. Copies may be obtained without charge by application made to Frederick W. Donahoe, secretary, 2202 Oliver Building, Pittsburgh.

MALLEABLE IRON IN 31 HR.*

Results of Experiments at Iowa State College— Possibility of Intermediate Products

IN a paper read before the Detroit meeting of this society in October, 1922, the results of experiments whose purpose was to shorten the annealing time for the malleabilization of white cast iron were given. *** The object of the present paper is to report the results of further experimental work whose purpose was to shorten further the annealing cycle for complete graphitization of white iron. Also, it was desired more carefully to study the conditions for the production of intermediate products, to develop new intermediate products and to investigate further their physical properties. *** Our previous work showed that it required about three hours at 1700 to 1800 deg. Fahr. completely to absorb massive cementite. This work also showed that the absorption of this cementite was much slower at the lower temperature used in the commercial process. It is essential that all massive cementite be absorbed before cooling starts and that the cooling be so regulated that no grain boundary cementite be precipitated as the temperature falls to that of the lower critical.

Having eliminated all free cementite for all temperatures above the critical, a further condition for obtaining complete graphitization is that the rate of cooling through the critical (the iron-carbon eutectoid) be retarded sufficiently to avoid the formation of pearlite. It is well known that this final cooling rate is 10 to 11 deg. Fahr. per hr. as a maximum. With these facts in mind the following treatment was used for shortening the cycle for complete graphitization. Ten standard $\frac{1}{2}$ -in. tensile test bars were placed on end, unsupported and unpacked, in an L. & N. hump furnace whose temperature was 1700 deg. Fahr. The temperature was dropped to 1200 deg. Fahr. and it required 40 min. for it again to reach 1700 deg.

This temperature was maintained for three hours and it was then lowered to 1560 deg. Fahr. for one hour. Then the cooling rate was reduced so that the bars cooled uniformly and slowly to 1320 deg. Fahr., which required 14 hr. or at the rate of 17 deg. per hr. At this time the rate was further reduced to 10 deg. Fahr. per hr. so that the bars cooled to 1200 deg. Fahr. in an additional time of 12 hr. The process was considered complete when 1200 deg. Fahr. was reached and it will be noted that the complete overall time required was within 31 hr. It has been shown that the iron-carbon eutectoid for white cast iron lies at 1419 deg. Fahr. and that it is easily under-cooled to about 1320 deg. Fahr. Therefore, in the above experiment the 10-deg. cooling rate was not used until a temperature of 1320 deg. Fahr. had been reached. Three of these bars were tested and gave the following results:

Tensile Strength, Lb. per Sq. In.	Yield Point, Lb. per Sq. In.	Elongation, Per Cent in 2 In.
48,000	30,200	14
45,500	30,400	11
48,200	30,900	12

It is believed that an application of these principles will allow a more rapid cooling rate between 1560 deg. Fahr.; also, it is almost certain that material can be removed from the furnace at temperatures higher than 1200 deg. Fahr. without hurting the resulting properties. A one-day malleable is well within the possibilities of laboratory demonstration.

It is considered desirable at this point to state rather carefully the principles which underlie the control of properties when graphitization is only partially completed. It is known that the effective strength of grain boundary cementite in hypereutectoid steels is very low, probably approximately 5000 lb. per sq. in. Grain boundary cementite, when present, also tends

*Abstract of a paper, "Possibilities of Producing Malleable Iron and Intermediate Products of Value in Short Annealing Periods," presented by Dr. Anson Hayes and W. J. Diederichs, Iowa State College, Ames, Iowa, at the Sixth Sectional Meeting of American Society for Steel Treating, Moline, Ill., May 22.

sharply and radically to reduce the ductility. As long as the massive cementite is present in a white iron at annealing temperatures there is always grave danger that grain boundary or "shell" cementite will form during the subsequent cooling. It is imperative, therefore, that the high temperature be maintained until all massive cementite be absorbed and further, the cooling down to the critical must be so regulated as to avoid the formation of "shell" cementite. This is necessary if materials having tensile properties of any commercial promise are to be obtained.

It is evident from the foregoing that combined carbon in excess of that to form pearlite will result in undesirable physical properties. It is known that in steels of normal structure the strength increases with carbon increase until a structure of 100 per cent pearlite is attained, at which time it has reached a value of 125,000 lb. per sq. in. and, though the ductility decreases with carbon increase, a pearlitic steel retains 10 per cent elongation. It would be expected, therefore, that a material of maximum possible strength would be obtained from white cast iron if the graphitization proceeded only until a pearlitic matrix resulted, and moderate elongations should still be retained. This material would then consist of pearlite containing about 10 per cent by volume of temper carbon and the result-

Table of Some Comparative Results

Treatment	Over-all Time, Hr.	Tensile Strength, Lb. per Sq. In.	Yield Point, Lb. per Sq. In.	Elongation, Per Cent in 2 In.	Impact Values (Izod)
3 hr. at 1700 deg. F.; cool to 1560 deg. F. in 45 min.		74,400	49,000	4	8
3 hr. at 1560 deg. F.; cool to 1200 deg. F.; cooling rate of $6\frac{1}{2}$ deg. F. per min.	8	67,800	49,000	3 $\frac{1}{2}$	3
		67,500	43,500	5 $\frac{1}{2}$	8
3 hr. at 1800 deg. F.; cool to 1650 deg. F. in 45 min.		69,000	49,500	4 $\frac{1}{2}$	8
3 hr. at 1650 deg. F.; cool to 1200 deg. F.; cooling rate of 5 deg. F. per min.	9	67,000	44,500	4 $\frac{1}{2}$	10
		72,500	47,500	5 $\frac{1}{2}$	8
3 hr. at 1800 deg. F.; cool to 1560 deg. F. in 1 hr. 20 min.		69,250	45,000	6	8
6 $\frac{1}{2}$ hr. at 1560 deg. F.; cool to 1200 deg. F.; cooling rate of 4 deg. F. per min.	13	68,750	45,600	5 $\frac{1}{2}$	8
		60,380	45,500	6	8
3 hr. at 1800 deg. F.; cool to 1650 deg. F. in 1 hr.		53,500	36,600	9	8
3 hr. at 1650 deg. F.; cool to 1200 deg. F.; cooling rate of 3 deg. F. per min.	10 $\frac{1}{2}$	56,600	36,100	8 $\frac{1}{2}$	8
		57,600	38,200	10	8

For Comparison

3 hr. at 1700 deg. F.; cool to 1560 deg. F. in 1 hr.	48,000	30,200	14
Cool to 1320 deg. F.: 31 rate 17 deg. 1 hr.	45,500	30,400	11
Cool to 1200 deg. F.; rate 10 deg. 1 hr.	48,200	31,900	12

Impact test on Malleable from same pour.....	14
Annealed with commercial run of work.....	15
	18

Remarks: Impact tests were run on bars from the same heat, but not on the same bars as used for tensile test. Tensile tests run on bars as cast.

ing properties should approach those of pure pearlite. If the graphitization is carried beyond this point, the strength should progressively decrease and the ductility should progressively increase until they attain values as found in normal malleable cast iron.

The table gives results achieved in five different treatments of white cast iron varying in overall time from 8 to 13 hr. At 10 $\frac{1}{2}$ hr. a material was produced which in tensile strength, yield point, elongation and izod value met the specifications of the American Malleable Castings Association.

There is a general rule known to hold for all normal iron-carbon alloys that the yield point has a value of

(Concluded on page 1832)

Research Inaugurated by Car Wheel Makers

Laboratory of Chilled Wheel Makers to Study the Effect of Various Elements on Physical Properties of Iron Car Wheels

TO what elements, singly or in combination, are the desirable physical characteristics of a chilled iron car wheel due? This question still lacks an answer which is scientifically correct because observations thus far have been in connection with large scale melting operations in which all or part of the usual elements in a car wheel have been present. These constituents include iron, silicon, carbon, manganese, phosphorus and sulphur. Experimentation in varying the proportions of these elements in the course of years of practice has developed a satisfactory mixture, but there is still no definite knowledge as to the exact ef-

of carbon from carbon crucibles or carbon electrodes as used in some types of electric furnaces. It was therefore decided to install an Ajax-Northrup induction furnace, built by the Ajax Electrothermic Corporation, Trenton, N. J.

The inductor consists of a coil of flattened copper tubing, wound edgewise, through which water is passed to hold it to a low temperature. No iron or steel core is placed inside the inductor inasmuch as the core would itself be heated and would not contribute to heating the charge by increasing the induction through it. In order to heat inductively without the use of



Arrayed on the Table Are Chill Test Pieces Broken to Show the Variation in Chill Due to Variation in the Amount of One Element in the Metal. The thin piece lying on top is a shrinkage test bar, while to the left are wear test wheels and tension test bars, one of which has been turned on a lathe and fractured. The Riehlé machine, to the right, was extended upward sufficiently to take a car wheel

fect of the different constituents, individually or in combination, on the resultant physical properties.

In view of an increasing propensity of users of car wheels to make their specifications more exacting both from a physical and chemical standpoint, the Association of Manufacturers of Chilled Car Wheels felt impelled to initiate an investigation to displace what has been mere assumption with incontrovertible facts. It therefore has established at the Sacramento Square, Chicago, works of the Griffin Wheel Co. a research laboratory in charge of Frederick K. Vial and A. D. Whipple, consulting engineer and assistant consulting engineer, respectively, of the association. Here it has essayed to start with pure iron and melt with it consecutively the other elements individually and in groups of two, three and four until all of the usual constituents of a car wheel are included. Varying proportions of each combination will be mixed, melted, cast and tested for physical properties and the results will be charted for comparative study.

Ajax High-Frequency Furnace Used

The first requisite in this research was a melting unit which would introduce no new elements into the charge either in the form of products of combustion, as in the case of fuel-fired furnaces, or in the shape

iron to increase magnetic induction, it is necessary to use a current of high frequency. The voltages induced in a conducting mass to be heated, are proportional to the rate at which the charge is cut with lines of electromagnetic induction. In melting iron or steel it is unnecessary to use a crucible made of conducting material. Heat—up to the point where magnetism is lost—is derived from two sources, hysteresis losses occasioned by the rapid reversals of magnetism and eddy currents induced in the charge. The latter factor, of course, continues to be a source of heat after the temperature has been reached where magnetism is lost.

The oscillatory high frequency current is supplied by banks of condensers and a non-vacuum mercury discharge gap, also constructed by the Ajax Electrothermic Corporation. The spark gap is formed by two graphite electrodes suspended over a bath of mercury. The space between the electrodes and the bath is filled with an atmosphere of grain alcohol, because air tends to act as an insulator. The high frequency current produced by this equipment consists of trains of rapidly damped out oscillatory discharges from the banks of condensers.

Current is bought from a public service company at 220 volts, 60 cycles, and is stepped up by a transformer to 6600 volts. The frequency obtained through



The Melting Unit Is an Induction Furnace Using a High Frequency Current and Deriving Heat from Eddy Currents Induced in the Charge and Hysteresis Losses Occasioned by Rapid Reversals of Magnetism. Two oil sand molds are to be seen in the foreground, while on a stand in the background are three zirconium silicate crucibles, the smallest cup being the first one successfully produced

the spark gap from the condensers ranges from 7500 to 15,000 cycles, the optimum for the operation of the furnace being about 12,000 cycles. The voltage induced in the furnace averages approximately 10,000.

Zirconium Crucibles Employed

Next in importance to obtaining a suitable melting unit was the selection of a satisfactory crucible. A layer of heat insulating material between the copper coil and the outer wall of the furnace prevents appreciable losses in temperature and hence it is possible to start cold and build up the heat to any temperature that a refractory will withstand. It was necessary, therefore, to provide a crucible of highly refractory material which at the same time would add no new elements to the charge.

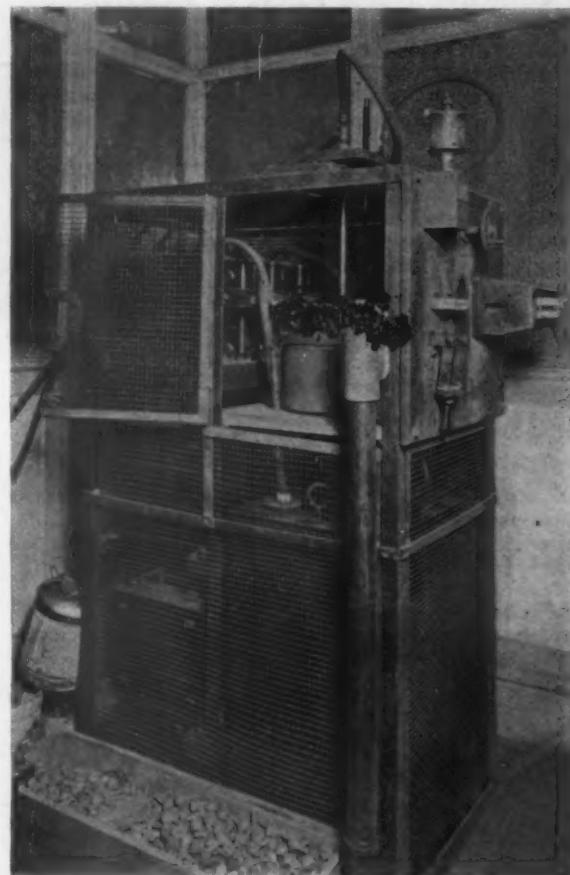
Zirconium silicate was known to be chemically inert, and it has the further advantage of having no coefficient of expansion or contraction under heat. The one great obstacle to its use as a crucible material lay in its utter lack of colloidal properties. After much experimentation the problem was solved. A mold was made of plaster paris and a solution of zirconium silicate in water was poured in. Through capillary attraction the material gathered on the bottom and sides of the mold and when a suitable thickness of the deposit had formed the water was drawn off and mold and contents were allowed to dry. After 10 days of drying the crucible cup had shrunk from the mold and was easily removable. It was then burned, and the result was a ware of high mechanical strength under conditions of high temperature.

Accurate determination of the temperature of a charge is effected by looking through a peek hole in the cover of the furnace with a Leeds & Northrup optical thermometer. At the completion of a heat the furnace is tilted and the contents are discharged into a pouring dish whence the metal passes into an oil sand mold. Various test pieces are made including a standard chill test piece cast against a chiller set in the mold, a tension bar, a wear test wheel cast against a chiller, and a shrinkage bar cast between chillers. The testing equipment embraces a 100,000-lb. Riehlé screw test machine, a scleroscope and a Brinell machine. Test pieces are turned down on an engine lathe.

Iron Phosphide Made to Introduce Phosphorus

In making up a charge it is necessary to start with substantially pure iron. Hence wrought Armco iron, which is very low in all of the recognized impurities found in a car wheel, was selected. When it came to adding the various other elements to the iron, difficulties were again encountered. Free phosphorus ignites under heat and is therefore not suitable for introduction into the charge. It was therefore obvious that some combination of phosphorus with iron would have

to be used. Such a compound, however, could not be found on the market in a chemically pure state. Experiments ensued and finally a satisfactory method of making iron phosphide was developed. This consisted of making up a mixture of tri-calcium phosphate, iron oxide, coke and sand in a graphite crucible and subjecting it to heat. The successful attainment of this end marked another step in the progress of the program undertaken. The work of the laboratory is developing steadily, though slowly, and the results finally achieved will no doubt prove an important permanent addition to metallurgical knowledge.



The Oscillatory High Frequency Current Is Supplied by Banks of Condensers and a Non-Vacuum Mercury Discharge Gap, Formed by Two Graphite Electrodes Suspended Over a Bath of Mercury. The frequency obtained ranges from 7500 to 15,000 cycles, the optimum for the operation of the furnace being about 12,000 cycles

International Management Congress to Be Addressed by Americans

The international management congress to be held at Prague, Czechoslovakia, July 21 to 24, will be addressed by several American engineers. The list of speakers and the subject of their papers are given in part below.

- "General Budget Control of Operations," Howard Coonley, president Walworth Mfg. Co., Boston.
- "Production Management," George D. Babcock, Holt Mfg. Co., Peoria, Ill.
- "Industrial Relations in Scientific Management," E. S. Cowdrick, industrial engineer, New York.
- "Management of Transportation," Roy V. Wright, managing editor, *Railway Age*, New York.
- "The Human Element in Scientific Management," Henry C. Link, New York.
- "Sales Management," C. K. Woodbridge, New York.
- "Vocational Education," C. R. Dooley, New York.
- "Management in the Coal Industry," Sanford Thompson.
- "Scientific Management," Fred J. Miller, public service commissioner of Pennsylvania.
- "Industrial Research in the United States," Maurice Holland, National Research Council, New York.

L. W. Wallace, secretary American Engineering Council, Washington, and the late Frank B. Gilbreth were elected to the Masaryk Academy. Mr. Wallace will present a paper on "Coal Storage," giving the conclusions of the Council's committee, which has recently completed an extensive study.

A preliminary meeting of American participants has been called for Sunday, July 20, at the Pantheon of the National Museum at Prague.

Seek to Make Airships Stronger

Tests to determine the possibility of getting greater strength for the same weight in airship girders are being undertaken by the Bureau of Standards. Such girders carry loads in compression or bending, or both, and their strength depends upon their design as well as upon the strength of the material. In the best duralumin girders of today the Bureau of Standards finds it possible to apply a load of only 20,000 lb. per sq. in. of the metal, whereas the metal itself will not yield under compressive stresses of over 30,000 lb. per sq. in. It is thought that better design, resulting in making all parts equally strong, may result in the strength of the girder approaching more nearly the strength of the metal. The correct calculation of the strength of such girders is considered impossible, and it will be necessary to make girders and girder parts of various promising designs and test them for strength.

Specifications for Cast Iron Pipes

After a thorough discussion at a conference in New York on June 5 of the various problems concerned in the proposal to bring about national uniformity in the cast iron pipe industry, agreement was reached on the following scope for this work:

- (1) Unification and development of specifications for cast iron pipe, including materials; dimensions; pressure ratings; methods of manufacture, including such new developments as centrifugal casting, in so far as they may be necessary to secure satisfactory results in preparation of workable specifications;
- (2) elimination of unnecessary sizes and varieties;
- (3) consideration of the possibility of developing a coordinated scheme of metallic pipe and fittings applicable to all common mediums, (possibly along the lines of the work being carried on in Europe on the same subject); and
- (4) methods of making up joints in so far as they are determining as to the dimensional design of cast iron pipe.

The types of cast iron pipe under standardization are to include:

- a. Flanged pipe.
- b. Flanged and bell mouth fittings and wall castings.
- c. Pipe elbows, tees, Y's, return bends, and other fittings not now included in standard lists.

- d. Cast iron pipe threaded for flanges or couplings.
- e. Soil pipe and other light types of cast iron pipe and fittings.

On June 12 the American Engineering Standards Committee ratified the recommendations of the conference that the work be carried out by a sectional committee under its auspices and under the joint sponsorship of the American Gas Association, the American Water Works Association, and the American Society for Testing Materials. The work will be coordinated with that of the existing sectional committee on pipe flanges and fittings, already well advanced under the sponsorship of the American Society of Mechanical Engineers, the Manufacturers' Standardization Society of the Valve and Fittings Industry and the Heating and Piping Contractors' National Association.

Highway Engineers Entertained at Newport

The Andrews Steel Co. and the Newport Rolling Mill Co., Newport, Ky., were hosts to the visiting delegation of the Pan-American Highway Commission, composed of highway engineers of all South American countries, and many from Central America and the West Indies, on June 11. The party, which is making a tour of the United States, was accompanied by several members of the Highway Education Board, Washington, and numbered over 100. The delegation was entertained at dinner at the Claremont, after which the plants of the companies were visited, followed by a tour over some of the roads in northern Kentucky.

Recuperative Annealing Furnace at Columbus

The Chapman-Stein Furnace Co., Mount Vernon, Ohio, has completed a car type recuperative normalizing and annealing furnace for the Buckeye Steel Casting Co., Columbus, Ohio.

The furnace is equipped with a Chapman-Stein refractory tile recuperator to utilize the heat in the waste gases to preheat the air for combustion. Only 5 to 10 per cent of the air necessary for combustion is used as compressed air and passed through the burners. The remainder of the air heated to a high temperature is supplied by the recuperators without the use of a fan.

The furnace will have a capacity of 10 tons per charge and will be used for annealing steel castings. It is now being fitted for oil burning and will be fired in about three weeks.

The New Mark Pipe Mills

Clayton Mark & Co. will be the name of an organization now being incorporated by Clayton Mark and associates to operate a mill in process of being equipped at Seventy-fourth and Robey Streets, Chicago. Two furnaces are being installed for two butt weld mills which will produce wrought pipe up to 3-in., in both black and galvanized. Other products which will be manufactured include conduit, nipples and unions, and well supplies embracing drive well points and other accessories. The plant will be housed in two buildings, 500 ft. long, in the former Symington ordnance plant, and is served by the Belt Railway of Chicago. The pipe capacity of the mills will be 70,000 tons annually. Mr. Mark was formerly the head of the Mark Mfg. Co. and its successor, the Steel & Tube Co. of America.

New Sintering Plant at Canton

The United Alloy Steel Corporation, Canton, Ohio, has taken a license from the American Ore Reclamation Co., Chicago, for the Dwight and Lloyd sintering process and will begin work at once on a sintering plant consisting of one Dwight and Lloyd machine with a capacity of 250 tons of sinter per day from blast furnace flue dust. The plant will be built under designs to be furnished by the American Ore Reclamation Co.

The Passing of a Leader in Industrial Publishing

The death of Horace M. Swetland at Montclair, N. J., on Sunday, June 15, takes a foremost figure from the fields of industry and of business publishing. Mr. Swetland was president of the United Publishers Corporation, of which the Iron Age Publishing Co. is a subsidiary, and was one of a small group of pioneers in technical and trade journalism which included among others David Williams, founder of THE IRON AGE, James H. McGraw, Charles T. Root and the late John A. Hill. Those who know how great has been his contribution to this important adjunct of American industry and what plans he had for greater accomplishments cannot but think of his passing as a loss that will long be felt.

The story of Mr. Swetland's advance to a place of leadership begins, as with so many typically American careers, in the simple life of the country. Born on a farm in Chautauqua County, N. Y., in 1853, he knew of hardship in his boyhood and early learned many of the fundamentals of success. He was a public school teacher at 17, and for 11 years in grammar and high school he followed that calling. In 1881 he left the school room in western New York to become the New York City representative of the Boston *Journal of Commerce* as reporter and subscription and advertising solicitor. That was the first experience of what was to prove his life career, but his entrance into the field of specialized journalism came three years later when he was made Boston representative of the New York publication *Power*. His next move was to New York to become manager of that paper. Among his associates at that time were James H. McGraw and Emerson P. Harris.

Mr. Swetland purchased *Power* in 1888 and was its publisher until 1900, when he sold it to John A. Hill. Meanwhile he started *Marine Engineering*, which he disposed of later. In that period he also acquired a controlling interest in the *Engineering and Mining Journal* which after a time he sold to John A. Hill and it is today, as is *Power*, an important unit in the McGraw-Hill group of engineering publications.

In 1902 Mr. Swetland saw the possibilities of the motor car field which was to engage so largely the energies of his riper years. Organizing the Class Journal Co., he first acquired the *Automobile* and later the *Motor Vehicle Review*, which were merged. Successive additions were the *Motor Age*, *Automobile Blue Book*, and *Motor World*. The *Commercial Vehicle* was started (now *Motor Transport*) and in 1917 *El Automovil Americano*, an export paper for the motor industry in Spanish countries. This was followed by the *American Automobile*, a parallel paper for English speaking countries.

Mr. Swetland's largest achievements in business publishing have been in connection with the United Publishers Corporation, which was formed in 1911 to bring together journals in iron and steel, machinery, textile, automotive and building lines. He was made

president in 1912 and has been its head ever since, continuing also as president of the Class Journal Co. In the fall of 1923 he negotiated the purchase of the Chilton Co., Philadelphia, publisher of a group of motor car magazines, this company and the Class Journal Co. now constituting together the automotive division of the United Publishers Corporation. He was president of the Federal Printing Co. and of the U. P. C. Realty Co., which owns the U. P. C. Building at 239 West Thirty-ninth Street, New York, and was a director of the Commercial Trust Co., New York.

In 1904 Mr. Swetland was the leading spirit in organizing the Society of Automobile Engineers, which has since become the Society of Automotive Engineers and now has a membership of 5000. In those days he

saw the necessity for bringing together the engineering talent of the automotive industry in a national society. He saw also the need of establishing engineering standards, if the industry were to develop in the large way that he prophesied.

Throughout his business career Mr. Swetland was a strong supporter of organization among publishers. He was for a time president of the Associated Business Papers, Inc., the national organization of publishers of technical and trade journals.

Two years ago he organized an educational course for the training of those engaged in the various departments of business publishing. He directed the preparation of studies which were taken up by classes in a number of cities and later, as chairman of the educational committee of the Associated Business Papers, Inc., he edited "Industrial Publishing," a volume of 290 pages which has become the recognized textbook on this subject.

Mr. Swetland was president of the National Publishers Association, the membership of which includes most of the important magazines of the country, monthly and weekly.

He was chairman of the delegation of 15 business paper publishers and editors who went from the United States to Great Britain in October, 1918. For two months the members of the party were the guests of the British Government in a tour that was designed to give to American observers an adequate conception of the British war effort.

Though but a bare summary of an exceptionally active career, what has been said above carries between the lines an impressive record of integrity, judgment, industry, courage and vision—qualities that were outstanding in his equipment for leadership. Mr. Swetland had a high conception of the possibilities of service to modern business that lie in an able, independent and forward-looking press. He had fine ideals and he laid down no tests for others which he was not willing to apply to his own performance. In canvassing the field for a proposed publication, the requisites, as he saw them, were that the paper should have a sound reason for existence in service to legitimate business, that the right men should be at hand for carrying out the plan, and third, that sufficient funds should be available to insure creditable functioning in the period of probation.

He had experience with trade journalism in its day



HORACE MONROE SWETLAND

of small things and lived to see the realization of much that he had contended for in higher standards of practice, particularly in making the editorial department independent of any advertising influence, in putting the reader's interest above all else and in making the largest possible contribution to the advancement of the industry represented. This last, always with due consideration of the interest of other fields of business and of the public

His devotion to the establishment of courses of training in business journalism and his efforts for the founding of the Society of Automotive Engineers, with the resulting standardization of a great industry, are expressions of a desire to serve his day, that had its springs, we may believe, in those years in the eighteen-seventies which he gave to the young life of Chautauqua County. Those who were closest to him in the day's work of later years had many proofs that his ambitions looked to the larger betterment of every organization and every institution with which he had to do. Many others in the business for which he did so much pay him the sincere tribute of wishing they might have been privileged to know him better.

Tribute of an Engineer-Editor

John M. Goodell, consulting engineer, New York, who was for nearly two decades editor of *Engineering Record*, pays a high tribute to Mr. Swetland in this letter to THE IRON AGE, which bears the marks of fine insight and an exceptional intimacy:

"Today's announcement of the passing of Horace Swetland means much to many men and to several important American industries. Probably only those who had the privilege of knowing him so well that he laid aside his customary reticence in talking with them can realize what he accomplished, how fine and high were his aims, and what a sterling character was hidden behind his unusual reserve. But those to whom he revealed these qualities and who know about his achievements owe it to his memory to put on record now their appreciation of the man.

"My own acquaintance with him dates back about 30 years, to the time when he was publishing *Power*. I was then assistant secretary of the American Society of Civil Engineers, after a few years' experience in the editorial department of *Engineering News* and with *Engineering Record*. You can imagine my gratification, having such a very sketchy journalistic background to lend anything of value to my opinions, when I discovered that what Mr. Swetland was really trying to get from me, without saying so, were my ideas on the kind of support from a publisher which most helped his editorial staff. Since that time several of his assistants have told me of their own observation of this extraordinarily developed desire he had to utilize in his organization everything promising he could discover by diligent search which would enable him personally to help his people.

"The late A. G. Batchelor was talking with me just before his death about his journalistic experience and summed it up by saying that he had learned more about how to do journalistic things right and how to treat people fairly from Mr. Swetland than from any of the other contacts made in his rather unusual and varied career.

"It is generally known, of course, that in the automobile field Mr. Swetland's business vision, sound judgment and pertinacity were of decided aid to a lusty, ambitious and often erring industrial infant. It is not so generally known that the clarity with which he distinguished between what was sound and what speculative in the industry was uncanny. And his occasional participation in a purely speculative enterprise in this field, acknowledging all the time that it was a gamble to yield a gentle agitation of nerve centers not stirred by the day's routine, was very human and interested his close acquaintances just as much as it did him, for he talked about these ventures much more freely than about his business. In so far as that business concerned the automobile industry he rendered service of the highest value, which the older men in the industry, the best judges of its worth, have repeatedly publicly praised.

"The help he gave the movement of 15 years ago to get a dollar's worth of real results from each dollar of road taxes was continuing, generous and very valuable.

"The most marked characteristics of Mr. Swetland's publishing methods have seemed to me to be governed largely by his extraordinary patience and his desire to have each task in his many enterprises performed by a person not only capable of doing it well but also temperamentally inclined to do it well through a liking for such work. He spoke to me a number of times in recent years about his firm conviction that the reason business papers sometimes had little 'life,' although excellent reporters of news, was that the perfectly accurate gathering and writing of business and technical news were not enough and that only a love for the work would give the product of an otherwise competent person the hall mark of distinction. Now, patience is a chief essential in organizing and maintaining such a staff and nobody ever had that characteristic in greater measure than he had it.

"The result is shown in all the details of the U. P. C. papers, in the excellence and abundance of the little news items of real business value, in the sound yet broad judgment shown in the longer articles, and in the high character of the advertising solicitation and of the service rendered to advertisers. The leadership which gathers and holds in a large, happy business family the men and women capable of doing these things this way is best evidenced by its results. Mr. Swetland kept himself far back of his stage, the public rarely saw him, and its praise went to those it saw, which is proper and desirable. That is what he wished while he was among us. But now that only his example and his teaching are left to us, we who have profited from them, who saw him at work, can pay our tribute to his worth as a business leader, a public-spirited citizen and a pioneer in developing better relations between employer and employee."

Old Material at Youngstown

YOUNGSTOWN, June 17.—Though there is little buying in the metal scrap market, prices show no recession from levels ruling in recent weeks. Dealers are making occasional purchases of "bargain" lots. Heavy melting steel is at \$16 per gross ton and some of the buying interests are inclined to believe any increase in buying would be almost immediately reflected in a firmer market. There has been some buying lately of borings and turnings by blast furnace interests to increase the iron content in the mix. Hydraulically compressed sheets are quotable at \$14.

Bar Iron Wage Basis Renewed

The Western Bar Iron Association, of which James H. Nutt, Youngstown, is secretary, has renewed the sliding scale wage agreement with employees, following a conference which started June 9 at Atlantic City with representatives of the Amalgamated Association of Iron, Steel and Tin Workers. The old agreement was continued in effect with few changes. Employees presented demands for increases in the base tonnage rates, but the manufacturers contended they were unable at this time to advance the base rate.

The Alabama Co., one of the smaller furnace interests of Alabama, is the center of many rumors right now, its stock fluctuating upward at a rapid pace. E. N. Rich, Baltimore attorney, is president. The company has one blast furnace in operation and a second one ready for the torch and two are obsolete. J. W. Porter is vice-president and general manager. The company is opening new coal mines, is pushing an entry into the famous Raccoon Mountain ore beds, building a washer at its coal mines and making other improvements. The company has sold a large quantity of coal ahead, has started on making pig iron for third quarter delivery and has disposed of a little tonnage of coke. No intimation is given of being absorbed by another company. Raccoon Mountain ore fields have recently received much comment in the St. Louis territory.

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ESTABLISHED 1855

THE IRON AGE

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Labor in the Campaign

FOUR years ago the American Federation of Labor did something it had never done before. It picked a side in the Presidential contest. There are not a few who believe that this resulted in the diversion of many votes away from the side picked.

For this campaign the American Federation of Labor adopts a different course. In the June number of the *Federationist* it publishes a four-page article headed "American Labor in the Campaign." The article is a marvel of style in presenting in smooth and temperate words demands which are radical and in some respects revolutionary. American labor has "certain definite legislative requirements" which are first stated in the following mild way:

- First: Laws to protect the helpless.
- Second: Laws to abolish special privilege and to free industry for the working out of its purely industrial problems.
- Third: Laws to make government more responsive to the needs of the people and to deprive courts of the power to rule as well as to adjudicate.

Very naively the article says that "the American labor movement . . . prefers the direct relationships and contacts of industry to the devious, indirect and frequently deceptive methods of politics." So do employers, so far as that goes; but how about collective bargaining by paid bargainers as the coal miners and the railroad workers employ? It is true the platform developed from the three principles above given calls for the abolition of the Railroad Labor Board, but that does not cover the United Mine Workers and other cases in which there are certainly no "direct relationships and contacts of industry."

As to immigration, if there is any difference of opinion between organized labor and others it is only as to degree. The *Federationist* article says "a policy of strict exclusion is imperative for many years to come" and wants us to come as near to "absolute exclusion" as possible.

The article calls also for the child labor amendment to the Constitution and makes the familiar demand for prohibition of injunctions in labor disputes, putting the demand in such form that if it were granted interminable disputes would result.

Injunctions are to be barred "under circumstances where no injunctions would lie if no labor disputes were in existence." These last quoted words are the familiar formula the unions have used for many years.

The constitutional amendment proposed by the 1922 convention of the federation is again put forward:

An amendment prohibiting the enactment of any law or the making of any judicial determination which would deny the right of the workers of the United States and its territories and dependencies to organize for the betterment of their conditions; to deal collectively with employers; to withhold collectively their labor and patronage and induce others to do so.

All of this looks perfectly innocent, except the two words "and patronage." Nothing is here desired and nothing would be given labor that labor does not already possess except one thing—legalizing the boycott. It is not particularly creditable to employ this camouflage.

The most astonishing feature is that "labor demands legislation repealing the Sherman anti-trust law." Here, indeed, is a curious issue. There are some men who do not like the Sherman law in general, but there are a great many men who are enthusiastically of the opinion that the worst thing about it is that the Clayton act ten years ago repealed it as to organized labor, and now organized labor is not content with the situation.

There are various other demands, including one for beverages with 2.75 per cent alcohol. With all these demands it is quite clear the American Federation of Labor cannot pick out a political party to support as it did four years ago. It is hard to believe it could find a single Congressional candidate to fit.

REASONS for the unsatisfactory conditions in the American copper market are found in the annual report of the American Bureau of Metal Statistics, recently issued. It is shown that Germany's copper consumption in 1923 was only 93,100 metric tons or next to the smallest in the last four years. The decline is over 37 per cent from the 1922 consumption, 148,200 tons, which

was the largest since the war. Similarly Germany's copper imports of 83,500 tons in 1923 were nearly 35 per cent less than in 1922. On the same statistical authority, the world's production of copper in 1923 was larger than the world's consumption for the first time since the war. Further curtailment of output as well as increased foreign demand are plainly indicated as the route by which American copper producers are to get out of the slough of profitless operation.

Rolled Steel and Ingot Outputs

THE trade pays so much attention to statistics of steel ingot production that the quantitative conception of merchantable steel output is sometimes distorted. The weight of steel mill products shipped by the steel mills to consumers and distributors is much less than the weight of ingots reported. The rolled steel reported is approximately three-fourths of the weight of the ingots. But even at that all rolled steel is not merchantable product of the steel industry as commonly defined, for rolled steel includes such items as skelp and rods, while the mills ship pipe and wire products, which weigh less than the skelp and rods from which they are made. The loss from the ingot to the merchantable product is chiefly scrap, which is remelted and thus passes over the ingot scale a second time. A much smaller loss is in scale, the recovery in that case being mainly by way of the blast furnace.

Much scrap is necessarily made by truing the ends or the ends and sides of material rolled. Rails, shapes, bars, universal plates, etc., must be trimmed on the ends, while sheared plates, sheets, etc., must have their sides trimmed also.

Another large scrap loss is due to the necessity of cropping ingots because they are unsound from piping and segregation. Practically ever since there has been an ingot much study has been given to the problem of producing a sound ingot, the whole of which could be rolled, or at least a much larger percentage than obtained in the common practice. Repeatedly it has been announced that much had been learned, that the way was opened for the rolling of a larger percentage of the ingot than formerly.

Yet the statistical fact is that the percentage of rolled steel produced to ingots produced has decreased rather than increased. There may be various influences involved, such as changes in the relative proportions of different classes of rolled material, and it is possible of course also that somewhat sounder ingots are being made now, with buyers correspondingly more critical as an offset. Any great change, however, would surely be reflected in the statistics, while what the statistics do show is a slight movement the other way.

The table shows the percentage which the rolled steel output constituted of the ingot output in each year of the past twenty. The rolled steel includes such items as rails, bars, shapes, plates, skelp, rods, sheets, tin mill production, etc. The statistics take the steel after it has had its last hot rolling, including necessary shearing, and

thus refer to rods rather than to wire, and to skelp rather than to pipe.

Percentage of Rolled Steel to Ingots

1904.....	75.7	1914.....	75.4
1905.....	76.0	1915.....	73.9
1906.....	76.9	1916.....	73.8
1907.....	78.3	1917.....	71.5
1908.....	77.5	1918.....	68.7
1909.....	77.0	1919.....	71.3
1910.....	79.0	1920.....	75.7
1911.....	76.4	1921.....	74.0
1912.....	76.1	1922.....	73.9
1913.....	76.4	1923.....	74.3

In the four war years 1915 to 1918, the production of rolled steel was particularly light on account of the manufacture of shell steel, which involved especially heavy cropping.

The simplest comparison is made by grouping the six years through 1909, which averaged 76.9 per cent, the five years through 1914, which averaged 76.7 per cent, and the five years through 1923, which averaged 73.8 per cent. Here is a progressive diminution in the yield of the ingot, insignificant before the war, of distinct importance after the war. The 11 years before the war showed 76.8 per cent, the five years since the war, 73.8 per cent. The difference of 3 per cent is equivalent on last year's ingot production to 1,300,000 tons of rolled steel. That is a fact that seems to deserve investigation.

Our National Tax Bill

ACCORDING to a report of the Bureau of the Census the grand total of revenues from taxation by the Federal Government for the fiscal year ended June 30, 1923, and by the State governments for the calendar year 1922 was \$7,428,749,000. Out of this total \$3,204,133,000 represented the revenues of the National Government, consisting of the following:

Customs, \$562,189,000.
Income and profit tax, \$1,691,090,000.
Miscellaneous taxes, \$935,699,000.
Tax on circulation of national banks, \$4,304,000.
Federal Reserve franchise tax, \$10,851,000.

The total revenues from taxes of the States, counties, cities, townships, and all other local political units were \$4,224,616,000, of which \$3,327,166,000, or 78.8 per cent, came from general property taxes. Special taxes, including inheritance, income, etc., contributed \$256,647,000; poll taxes, \$29,140,000; licenses and permits, \$408,271,000, and special assessments, \$203,392,000.

This first complete official statement on the sources of public revenues enables us to get a general picture of the nature of taxation in the United States, and by correlation with other data we can make some sound deductions respecting its incidence.

First, as to its nature. It appears that we have a hodgepodge of systems. The Federal Government derived a little more than half of its revenue from the income and profit taxes. Its next largest source was the "miscellaneous" taxes, which range from the inheritance taxes (that are levies on capital) to the charges on telephoning, amusements, luxuries, etc. (that are consumption taxes). The third largest source of revenue to the Federal Government is the customs duties, which partake largely of the nature of a consumption tax.

The revenue of the States is derived partly

from income taxes, inheritance taxes and excises, but to the extent of nearly 80 per cent of the total it comes from the taxation of physical property, thus bringing in another major principle of taxation, which is one of the older forms.

We see, therefore, that although levy on capital is one of the most odious and uneconomic forms of taxation we already have it to a considerable extent. We see, moreover, that although there is strong popular opposition to consumption taxes we already have them, albeit more or less disguised. The theory of these partial consumption taxes is, of course, to get something out of people who possess no physical property and to whom income taxation can not be applied owing to the disproportionate cost of collection.

The national income in 1922 was about 60 billion dollars. Consequently the total of taxation was about 12.5 per cent thereof. The total value of physical property in terms of the current dollars was probably about 330 billions. Consequently the average rate of taxation on it was about 1 per cent.

A consideration of these bald data will reveal quickly the great inequality in the incidence of taxation in the United States. The property tax falls chiefly upon the owners of real estate and other physical property. Of course in so far as the latter is owned by corporations the burden is distributed among their stockholders, who are numerous. Apart from the farmers, about 45 per cent of the people of the country own their own homes. The property tax, in so far as housing is concerned, thus falls upon that percentage, plus the landlords who own the property that is rented, plus the farmers. The farmers own about one-fourth of all the physical property of the country and the taxes they pay thereon are probably about in the same proportion. It is true, however, that the rate of property taxation averages less in the rural regions than in the urban.

The income and inheritance taxes fall, of course, more severely upon the well-to-do and are intended to do so. The same class pays heavily in property taxes and in the consumption and excise taxes. Barring the customs duties the consumption taxes are avowedly designed to fall upon the same class that pays the income taxes. Wherefore it is evident that our occasional consumption taxes do not fulfill to any great extent the purpose of collecting something from those who escape income taxes. Still barring the customs duties, the only consumption taxes of widespread incidence are those on tobacco.

It is sometimes argued that taxes are passed on to consumers, no matter in what form they are levied. That is true to only a limited extent. The telephone companies do not pass on the taxes on messages but simply act for the Government as the collecting agent from the consumer who pays those taxes directly. Likewise act the theaters.

In some instances of non-competitive business it is possible for the producer to figure taxes as a cost and fix his price at cost plus profit. In such instances the payment of the tax is in reality transferred. But in general the taxes that are derived from income, profits and property are borne by the immediate payer and by him only. The

idea that they are passed on from one to another, multiplied in the process, until they come to rest with the ultimate consumer is quite erroneous. The gross revenue of the producer, whether of goods or service, is derived from his sales. His sales are determined by conditions of demand and supply. A producer of goods whose cost of production is greater than the market price for his product must either sell at a loss or refuse to sell at all. Whatever be his proceeds, the taxes that he has to pay come out of it and diminish what is left for himself by just so much.

In the matter of real estate it is the landlord who pays the tax, not the tenant. The rental is determined by the market for the kind of property rented. The landlord, of course, deducts taxes, as well as insurance and other expense, before he figures his net yield, and the very fact that he does so shows that he is not passing them on.

With our existing system of taxation it is probable that no one knows just how much he pays in taxes. He may know how much he pays in property tax and direct income tax. If he be painstaking and employ a bookkeeper he may know how much he pays as excise taxes, licenses and some consumption taxes. If he be an owner of corporate stocks he generally does not know how much he is paying through the corporations in which he is interested. Much less does he know how much he pays in the form of customs duties. Without pursuing this subject any further, however, it is clear that if the aggregate of taxation is about one-eighth of the national income there are some people who pay a great deal more than that percentage, some who pay less and a great many who do not pay anything. Any idea that the brunt of taxation falls on the masses of the workers is buncombe.

The real way in which the burden of taxation falls upon the poor is indirect, by which is not meant any snowballing transfer. The actuality is through the diminution of production which leads to high prices by curtailing supply while demand is always growing. The concentration of taxation upon the well-to-do, according to the principle of taxation, according to the ability to pay, deprives the thriftier class of people of the ability to save, which spells crippling of ability to provide means for new production. The people who are relieved from taxation become more extravagant at the same time.

The ease with which money can be extracted from the well-to-do is apt to lead, moreover, to taking from them more than is really needful and employing the proceeds for governmental service, which spells the diversion of labor from the production of goods to the production of service. All of this tends to increase the price for goods, to increase the cost of living. Thus, a great many people who escape taxation suffer the consequences of it, just as does the school boy who habitually plays hookey. The fact that more than five years after the armistice the general price level in this country, which was thrown out of joint by the conditions of the war, is still about 1.8 times the pre-war (commodities alone, 1.48 times), is largely ascribable to the operation of economic law in the way we have described.

CORRESPONDENCE

Iron Ore Supply and Availability

To the Editor: Permit me to discuss very briefly your editorial, "Iron Ore in Abundance," printed in the issue of June 12:

As to your figures of total iron ore reserves I have no question, but want to call attention to their application, for it seems to me that they tend toward erroneous conclusions. You state that the world's reserves of commercial ores are roughly 25 to 30 billion tons, of which North and South America contain 65 per cent.

A commercial iron ore is so not only because its grade is such as to permit it to be smelted commercially, but also because of other factors, in which transportation probably is first. Others are markets, availability of fuels and fluxes, supplies, etc. Many ores are theoretically commercial, the use of which is impracticable at present, and may continue to be so for long periods of time.

What has brought the ores of Lake Superior to their point of vast consumption? The highway of the Great Lakes, the presence of suitable fuels near the market, the comparative ease of mining. By no means their grade alone. Grade is a relative term; what it may mean as to Lake ores, it does not as to the Ruhr or England, for instance. What holds back the ores of Brazil, in quantity, you point out, 25 per cent of the world's supply? Not their grade, but transportation, fuel and markets. What has caused the long delay in the use of Cuban north coast and interior limonites, which are not really commercial as they are mined? Not transportation, but manipulation costs. What has kept at so modest a figure the exports from Newfoundland? Neither transportation nor grade, but markets. A like question can be asked as to many of the greater deposits of the world, and varying but perfectly logical replies can be given.

Figures, impressive though they may be, are misleading if given without explanation. No doubt most of your readers have the explanation already in their minds, but some have not, naturally. It seems to me that none of these general figures of iron ore reserves are of especial consequence unless they are properly qualified.

You refer to the surrender of the Hill leases by the Steel Corporation, and imply that this action was because the corporation had found out that "there would be no ore famine." I take it that the corporation did not assume the Hill leases from any such feeling, and

that it had abundant information as to ore supplies and possible famines, but that its assumption of those leases was for an entirely different economic reason, while their abrogation was due to various causes, none of which had much to do with total quantities of ore required by it.

DWIGHT E. WOODBRIDGE.

Duluth, Minn., June 14.

Fellowships in Cooperation with Bureau of Mines

Graduate fellowships in mining, metallurgical and chemical research are offered by various institutions of learning, in cooperation with the Bureau of Mines, Department of the Interior. The purpose of these fellowships is to undertake the solution of various problems being studied by the Bureau of Mines that are of especial importance to the regions in which the institutions of learning are located. They afford excellent opportunities for qualified young men to become experts in the fields of mining, metallurgy and chemical technology, and to prepare themselves for highly technical work in these fields.

For the college year 1924-1925, the following institutions offer such fellowships:

University of Alabama, Tuscaloosa, Ala.
University of Arizona, Tucson, Ariz.
Carnegie Institute of Technology, Pittsburgh.
University of Missouri, Rolla, Mo.
Ohio State University, Columbus, Ohio.
University of Utah, Salt Lake City, Utah.
University of Washington, Seattle, Wash.
University of Idaho, Moscow, Idaho.

Detailed information in regard to these fellowships may be obtained from the Department of the Interior, Bureau of Mines, Washington, or from the various institutions named.

R. D. Wood & Co., Philadelphia, has concentrated at Florence, N. J., its work in hydraulic machinery, hydraulic valves and automatic gas producers formerly turned out at Camden. The old Camden Iron Works has been dismantled, while the works at Florence have been increased by new machine shops, hydraulic valve shop, brass foundry, pattern shop and gray iron foundry.

The Chicago Malleable Castings Co., West Pullman, Chicago, has installed a department for the manufacture of brake beams under the management and supervision of James H. Slawson, formerly vice-president and general manager of the Joliet Railway Supply Co. Mr. Slawson has an office at 435 Railway Exchange Building, Chicago.

The Iron Age and Its Readers

ONLY a company which wrote its first contract around a small paragraph it found in THE IRON AGE knows the full value of our items announcing the plans of companies newly formed, unless it be a company that has found a new customer, or purchased equipment, or obtained favorable bids through these items. Economy of space and the convenience of the reader require brevity in such information. There is no story, no speculation; just the facts.

It is gratifying to receive letters recognizing the help THE IRON AGE has given newly launched companies. "Bids were received from all over the country," one letter says, "and we tied up with the — — Co." A

maker of special machinery stated in person: "During the last month we have received more direct orders through leads from this section of THE IRON AGE and from your New York Machinery Market than from all other sources combined."

Every item in our "Plans of New Companies" column comes directly from the company through personal call or letter. Many enterprises are born each week. To give in few words the address, capital, principals, products and plant needs of the most promising is the object of our news service. The benefit is threefold—to the company an introduction to the trade, to the trade a new customer, to THE IRON AGE a new friend.

European Plants Showing More Activity

British Steel Business at Low Ebb—Central Europe in a Bad Way—Belgium and France Complain of German Competition

(By Cable)

LONDON, ENGLAND, June 17.

PIG iron is unsettled. Consumers are not anxious buyers, either for domestic use or export. Makers are inclined to look for quiet conditions, though appreciation of the franc rate may revive Continental demand. Scotch prices are weaker. Foundry iron prices named include £4 15s. to £4 17s. 6d. (\$20.52 to \$21.06) at furnaces. Hematite is dull and easier, with stocks accumulating and talk of curtailment in the output before long.

Orders for Steel Scarce

Steel buying is at the lowest ebb for some time. There are practically no orders for imported tonnages arriving, while the few scattered inquiries for small parcels do not always materialize. Makers are considerably perturbed at the official passing of the Indian steel industry protection bill.

May exports of pig iron from Great Britain were 75,749 tons, of which 5355 tons were consigned to the United States. The total foreign shipments of iron and steel amounted to 406,919 tons. [This is a heavy increase over the April figures of 48,758 tons of pig iron and 336,799 tons of all iron and steel. In April the United States took only 100 tons of pig iron from Great Britain.]

Central Europe in the Doldrums

Continental position is complicated further by a fresh appreciation of the franc exchange. India recently has bought heavily but other markets generally are disinterested.

In Belgium 45 furnaces were blowing on June 1.

In Germany business is curtailed by the money shortage. The Becker Stahlwerk has secured foreign

credit and intends to resume work. The Rothe Erde Werk, belonging to the Deutsch Luxemburg group, is closing its billet mill and possibly its steel works later.

In Poland the crisis is acute. The Oberschlesische Eisenbahnbedarfs at Friedenshütte is discharging 2600 men. The Oberschlesische Eisenindustrie at Baildonhütte, Kattowitz, has shut down its sheet rolling mill. Königshütte is discharging 2000 hands and Laure Hütte is discharging 500 of the 1100 still employed.

Krupp is reported to have secured a Turkish railroad material order to the value of £800,000 (Turkish).

Sheets and Tin Plate

Tin plate is rather quiet, after a short spell of activity, but galvanizers are moving prompt and forward shipments to Japan and other Far Eastern markets are displaying more interest than for some time. South America also is a fair buyer.

Galvanized sheets are firm, with nice, steady business continuing. Makers are well sold and now are quoting for September onward at £18 (3.47c. per lb.) f.o.b.

Black sheet demand from the Far East is being maintained. Makers' prices are advancing, owing to well-sold order-books. Japan 6 x 3, 13s, 107 lb. are held at about £18 10s. (3.57c. per lb.) f.o.b.

FRENCH IRON AND STEEL MARKET

Better Business with Price Stabilization—Sheet Plants Busy—600 Railroad Cars Ordered

PARIS, FRANCE, June 6.—Selling prices generally have stopped declining and have even made a step toward improvement in some cases; both in domestic

British and Continental prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.32 per £1, as follows:

Durham coke, delivered	£1	7s.	to £1	7½s.	\$5.83 to	\$5.94
Bilbao Rubio ore†	1	4			5.18	
Cleveland No. 1 foundry	4	15			20.52	
Cleveland No. 3 foundry	4	10			19.44	
Cleveland No. 4 foundry	4	9			19.22	
Cleveland No. 4 forge..	4	8			19.01	
Cleveland basic	4	11			19.66	
East Coast mixed....	4	17	to	4 17½	20.95 to	21.06
East Coast hematite...	4	19	to	5 0	21.38 to	21.60
Ferromanganese	17	0			73.44	
Rails, 60 lb. and up....	8	10	to	9 10	36.72 to	41.04
Billets	8	0	to	8 5	34.56 to	35.64
Sheet and tin plate bars, Welsh	8	12½			37.26	
Tin plates, base box...	1	2%	to	1 3	4.89 to	4.97
					C. per Lb.	
Ship plates	9	5	to	9 15	1.78 to	1.88
Boiler plates	13	0	to	13 10	2.51 to	2.60
Tees	9	7½	to	9 17½	1.81 to	1.90
Channels	8	12½	to	9 2½	1.66 to	1.76
Beams	8	7½	to	8 17½	1.61 to	1.71
Round bars, ¾ to 3 in.	9	17½	to	10 7½	1.90 to	2.00
Galvanized sheets, 24 g.	17	15	to	18 0	3.42 to	3.47
Black sheets, 24 gage..	13	0			2.51	
Black sheets, Japanese specifications	15	5			2.94	
Steel hoops	12	10	&	12 15*	2.41 &	2.46*
Cold rolled steel strip, 20 gage	17	2½			3.30	

*Export price. †Ex-ship. Tees, nominal.

Continental Prices, All F. O. B. Channel Ports

(Nominal)

Foundry pig iron :			
Belgium	£4	5s.	\$18.36
France	4	5	18.36
Luxemburg	4	5	18.36
Billets :			
Belgium	6	0	25.92
France	6	0	25.92
Merchant bars :		C. per Lb.	
Belgium	6	15	1.30
Luxemburg	6	15	1.30
France	6	15	1.30
Joists (beams) :			
Belgium	6	15	1.30
Luxemburg	6	15	1.30
France	6	15	1.30
Angles :			
Belgium	8	0	1.54 to 1.59
¼-in. plates :			
Belgium	8	0	1.54
Germany	8	0	1.54
½-in. plates :			
Luxemburg	8	0	1.54
Belgium	8	0	1.54

and export markets the current of trade has increased in appreciable proportions. Unfortunately, this slight revival of trade is undoubtedly due to the collapse of the franc. The German crisis, which seems attenuated, in preventing the Ruhr metallurgists from undercutting the prices on the export markets of Antwerp, Rotterdam and London, has had a steady influence. For a moment it was feared the Sarre also would be involved in the storm, but there is some hope now that the situation will improve in the immediate future.

Coke.—May deliveries from the Ruhr to the ORCA were on the average 8610 tons a day, or 260,732 tons altogether. For the first two days of June 11,353 tons were received through Ehrang and 8193 tons through Aix-la-Chapelle, 19,546 tons altogether. On June 3, by Ehrang, 8309 tons were received and it would be necessary to go back to April to find such a good daily average. The coke crisis seems again avoided; work has been resumed in a large number of cokeries. The price of indemnity coke is unaltered for June and remains at 150.75 fr. per metric ton (\$7 per net ton), parity frontier ORCA'S charges included).

Pig Iron.—Production of pig iron in April was an unprecedented record; nevertheless, the market is quiet on the whole, in spite of a larger demand. June dealings in chill-cast iron No. 3 have been made at 360 to 370 fr. per ton (\$18.74 to \$19.26), East or Lorraine works; perhaps a lower price could be obtained, but this most likely will disappear now owing to the pressure of exchange. For May the price of a founders' cooperative association was established at 358.45 fr. per ton (\$18.66) for chill-cast iron No. 3. For export, f.o.b. Antwerp, the average is around 355 fr. per ton (\$18.48), at plant. For hematite iron, prices vary according to origin and grade, at 430 to 450 fr. per ton (\$22.39 to \$23.43) at works. With sterling at 85 to 87 fr., the marketing of British irons in France is impossible.

Semi-Finished Steels.—The market for semi-finished products is unaltered; ingots are worth 42 to 43 fr. (\$21.87 to \$22.39; blooms, 43 to 44 fr. (\$22.39 to \$22.90); billets, 45 to 46 fr. (\$23.43 to \$23.95) in basic steel per 100 kilos East or Lorraine; open-hearth grades being valued 4 fr. higher. F.o.b. Antwerp, billets have been quoted £5 15s., or, with the £ at 80 fr., 488.75 fr. (\$25.45), which seems rather a good price. Largets have been quoted £6 2s. 6d. (536 French francs or \$27.90).

Rolled Steels.—The market is steadier. The continuing increase of sterling has led numbers of buyers to cover their indispensable needs, while others, thinking the situation of exchange could be only worse in the forthcoming days, did not hesitate in laying in their stores for the whole summer; hence prices are firmer and even upward and delivery times have been lengthened.

In beams, offerings on the part of producers are less pressing; prices are steadier, the average now being 54 to 56 fr. per 100 kilos (1.25c. to 1.30c. per lb.) East or Lorraine mills; in merchant grades prices vary between 55 and 58 fr. (1.28c. and 1.35c.), with a tendency to improve; delivery in 6 to 10 weeks. For small shapes the average is 57.50 to 60 fr. (1.34c. to 1.39c.), with longer delays than for large samples. The rates hardened for export and we note the price of £6 10s. (550 to 555 fr. or 1.28c. to 1.29c.) for beams; £6 10s. to £6 12s. 6d. (560 to 565 fr. or 1.30c. to 1.31c.) for steel bars.

Sheets.—This department is the most favorably disposed of all the list; the selling conditions differ from one plant to the other, according to the volume of orders booked ahead. In bank plates prices range between 70 and 80 fr. (1.63c. and 1.86c.) in basic steel, delivery 3 to 4 months, the plants being fairly busy. Light sheets are less firm and extremely variable; in the Northeast region some light basic close annealed sheets are worth 100 to 125 fr. (2.32c. to 2.90c.), according to type, with 5 fr. less per 100 kilos for orders of at least 20 tons.

Open-hearth structural sheets, 5 mm. (No. 6½ gage) and above, are worth 75 to 80 fr. (1.74c. to 1.86c.) in the North; 87 to 88 fr. (2.02c. to 2.05c.) in the East; 80 to 82 fr. (1.86c. to 1.91c.) in Lorraine; 84 to 86 fr. (1.95c. to 2c.) West; delivery 10 weeks to 4 months. At such a rate the Belgians have a chance to compete suc-

cessfully with us along the Northeast frontier. Boiler sheets are upward: 84 to 86 fr. (1.95c. to 2c.) at mills, East; 110 to 120 fr. (2.56c. to 2.79c.) at mills, Center.

Wire Products.—Less offered than before. A good many orders were secured these last few days; prices are steadier at 70 to 72 fr. per 100 kilos (1.63c. to 1.67c. per lb.) at works.

Construction.—In the motor industry work is normal, but fresh business is getting scarcer. In the shipbuilding department the few orders placed at the time of the crisis of the franc are being executed, but, as the home demand is nil, activity is moderate. Perhaps we shall see again a few orders from abroad if the rates of sterling continue to increase. Rolling stock builders have just booked an order for 600 metal cars for the East railroads.

Scrap.—The market is quite calm as far as new business is concerned. The stock owners will not make concessions, owing to the actual situation.

BELGIAN STEEL ORDERS SCARCE

Pig Iron Business Better—German Competition Feared—Comparisons with 1913

BRUSSELS, BELGIUM, June 6.—The market continues tradeless through lack of confidence. Foreign buyers defer orders or offer very low prices, believing that the decline will only be intensified with the progressive exhaustion of the order books and the increase of German competition.

Germany, thanks to the perfection of her means of production, to the abolition of the 8-hr. day and to the lack of an inland market, soon will be quoting lower prices than Belgian, Luxemburg, French and occasionally British exporters on the markets where she has been working already.

F.o.b. Antwerp, both Luxemburg and Lorraine plant offers are about equal to the Belgian, while the Germans are making lower quotations.

Coke.—During the first 20 days of May, the deliveries to Belgium amounted to 21,900 tons of coke and 57,000 tons of coking coal; it is anticipated generally that the deliveries for the whole month will be less by 12,000 tons. On June 1, the average price for coke was 155 fr. (\$7.01) for the ordinary grade, against 163.50 fr. (\$7.39) on May 1 and 175 fr. (\$7.91) on April 1; the semi-washed coke was on June 1 at 175 fr. (\$7.91) against 183.50 fr. (\$8.30) on May 1; 195 fr. (\$8.82) on April 1. Washed coke was on the average of 195 fr. (\$8.82) against 208.50 fr. (\$9.43) and 220 fr. (\$9.95).

Pig Iron.—The situation is better, although business is rather on a restricted scale, Great Britain offering lower prices. In chill cast No. 3, the average is 400 to 410 fr. (\$18.09 to \$18.54) per ton at plants; f.o.b. Antwerp, Belgian and Lorraine plants ask the same prices: in basic, 385 to 395 fr. (\$17.41 to \$17.86).

Semi-Finished Products.—Uncertain and artificial market. Quotations range around 540 fr. (\$24.42) for billets on the inland market, while the export prices are £5 15s. to £5 17s. 6d. (\$24.84 to \$25.38); largets, £6 2s. 6d. (\$26.46). British dealers will accept only inferior prices.

Iron.—Very little business. Consumption is nil while the order books are gradually exhausted. In spite of the rise of sterling, the rates are being maintained but the demand is stationary. Iron No. 3 is worth 600 to 625 fr. (\$27.13 to \$28.26).

Finished Steel.—For export and in spite of the pressure of exchange business remains scarce and difficult. On the other hand, the home demand is better and prices sustained; requirements are covered rapidly, fearing depreciation of our currency. German offers in Antwerp disorganize the market.

Dealings are made under nominal quotations. The home rates for bars stand on the average of 625 to 635 fr. (1.26c. to 1.28c. per lb.) and £6 10s. to £6 12s. 6d. (1.25c. to 1.28c.) for export. In London, the German offers are £6 7s. 6d. (1.23c.). The home ruling quotation for beams is 600 to 625 fr. (1.21c. to 1.26c.) and

	June 1, 1913—	Fr.	June 1, 1924—	Fr.
Chill-cast iron, Charleroi grade.....				
Basic	80	\$15.68	400 to 410	\$18.09 to \$18.54
Blooms (for export).....	85	16.66	385 to 395	17.41 to 17.86
Blooms (inland).....	125.25	24.56	520	23.51
Billets (export).....	130	25.49	525	23.74
Billets (inland).....	132.75	26.03	540	24.42
Rods (inland and export).....	134.50	26.37	545	24.64
Rods (export).....	141.25	27.70	775	35.04
Steel rails (export).....	143.75	28.19	750	33.91
Steel rails (inland).....	150	1.31c.	725	1.46c.
Steel bars (export).....	175	1.53c.	725	1.46c.
Beams (export).....	126.25	1.11c.	620	1.25c.
Steel bars (delivered).....	142.80	1.25c.	600	1.21c.
Beams (delivered).....	142.50	1.25c.	630	1.27c.
Basic steel sheets (export).....	165	1.44c.	620	1.25c.
Homogeneous metal sheets (export).....	143.75	1.26c.	720	1.45c.
Basic steel sheets (inland).....	155	1.36c.	725	1.46c.
Homogeneous metal sheets (inland).....	155	1.36c.	730	1.47c.
	167.50	1.47c.	740	1.49c.

£6 10s. f.o.b. Antwerp; the Lorraine and Luxembourg plants are making the same prices. Rods are valued 740 to 750 fr. (\$33.46 to \$33.91) and £8 5s. to £8 7s. 6d. (\$35.64 to \$36.18). Cold rolled hoops are worth about 1300 fr. (2.62c.).

Sheets.—Order books are pretty near exhaustion, and the era of price concessions is opened. A few dealings are made at home, but export prices are judged too high as compared with the German. The inland prices for the 5 mm. (No. 6½ gage) sheets range between 725 and 770 fr. (1.46c. and 1.55c.); and £7 17s. 6d. to £8 5s. (1.52c. to 1.59c.) for export, while the German plants ask £7 10s. to £7 12s. 6d. (1.45c. to 1.47c.). For the 3 mm. (No. 11½ gage) sheets, Belgians quote 825 to 850 fr. (1.67c. to 1.72c.) and £8 10s. (1.64c.) f.o.b. Antwerp, while the Germans ask £8 5s. to £8 7s. 6d. (1.59c. to 1.61c.). The 2 mm. (No. 14 gage) sheets are worth 900 to 925 fr. (1.82c. to 1.87c.); 1½ mm. (No. 16½ gage) sheets, 950 to 1000 fr. (1.92c. to 2.02c.); 1 mm. (No. 19½ gage) 1100 to 1200 fr. (2.22c. to 2.42c.); ½ mm. (No. 25½ gage) sheets, 1300 to 1400 fr. (2.62c. to 2.83c.). Galvanized sheets are weak and without business. Prices are 1650 to 1675 fr. (3.33c. to 3.38c.) for the 1 mm.; 1975 to 2000 fr. (3.99c. to 4.04c.) for 0.8 mm. (No. 22 gage); 2450 to 2475 fr. (4.95c. to 5c.) for ½ mm.

Scrap.—Very little activity on this section, the renewal of contracts is generally differed. The ruling quotations are 230 to 290 fr. (\$10.40 to \$13.11) per ton for open-hearth, and 400 to 410 fr. (\$18.09 to \$18.54) for machine shop scrap.

The above table shows the rates for the principal iron and steel products at the beginning of June as compared with those of 1913. Prices in metric tons are translated into dollars per gross ton or cents per pound.

French Iron and Steel Production in April

The number of furnaces on blast on May 1 was 136, as on April 1; 39 were out; 45 in construction or under repair; altogether 220 furnaces. The production has been increased; pig iron made a new high record.

Pig Iron.—651,323 tons in April (against 639,534 tons in March) including 139,750 tons chill-cast iron (129,066 tons in March) and 458,514 tons basic iron (458,540 tons in March).

Steel.—567,485 tons (against 572,916 tons in March) or a decrease of 5431 tons; 553,926 tons of ingots and 13,559 tons of castings were made, including 367,280 tons in basic steel and 186,535 tons in open-hearth steel, against respectively 374,609 tons and 183,988 tons in March.

GERMAN IRON AND STEEL DULL

Financial and Labor Troubles—Price Declines—Fuel Shortage Acute

BERLIN, GERMANY, May 31.—Conditions in the West German iron industry are not improving. There were already signs of an advancing lull in the iron market some weeks ago, but the acute financial crisis and the differences between employers and men have further weakened the market. Prices have decreased again during the last few days, as demand has diminished, and many firms are selling more cheaply than the average market price, to get ready cash. Bar iron, for instance, which was sold at 140 marks per metric ton (1.51c. per lb.) some time ago, has come down to 130 marks (1.40c.), but even at this price demand remains small. Prices of other grades also have been reduced on the average by 25 marks per ton compared with their highest stand a few weeks ago, but business still is slack. Only in fine plates a fair trade is done. Foreign competition has increased, especially from the Belgian iron works, which quote bar iron at £6 5s. (1.25c. per lb.) f.o.b. Rotterdam. At present business is quiet and orders generally are given only on a three-month credit.

Average works quotations per ton are, at present:

	Metric Tons	Marks per Metric Tons	Cents per Lb.
Blooms	110	\$26.62*	
Billets	118	28.80*	
Bar iron	130	1.40c.	
Structural shapes.....	128	1.38	
Universal iron.....	142	1.53	
Hoop iron	175	1.89	
Heavy sheets	140	1.51	
Medium sheets.....	170	1.84	
Plates 1 to 3 mm.†.....	185	2.00	
Plates below 1 mm.	195	2.11	
Wire, rolled.....	160	1.73	
Wire, drawn, bright.....	180	1.95	

*Per gross ton. †No. 19½ to No. 11½ gage.

There is considerable price cutting, and some firms are selling at times below cost, to get funds for pay-

ment of wages. The works are making every endeavor to get foreign orders, as customers abroad are in a position to pay promptly. German export quotations are at about the same level as prices of foreign competitors. Because of scarcity of ready capital many firms will be forced to reduce production, if present conditions continue.

Profits Lacking and Dividends Unpaid

Several large firms have issued their balance sheets for the last business year but generally they are not paying any interest. Judging by the reports of other large iron works, which finish their business year on June 30, they also do not seem to be in a position to pay interest. The extensive strikes in the iron and engineering industry and the present struggle in the coal line, together with diminishing sales and financial troubles, make favorable results very improbable. The Becker steel works, which have been in financial difficulties for some time, have given notice to their employees, as it is intended to close the works entirely. The Reinhold Hütte has been shut and the main works at Willich are to stop production within the next two weeks.

In German Upper Silesia the iron industry is affected largely by the strike in the coal industry in the district and conditions show no improvement. Ore prices are stiff and trade in pig iron is slack. Demand from Polish Upper Silesia has diminished. Sales to other parts of Germany have increased, but prices leave only a small margin of profit. Demand in bar iron, structural shapes and plates is weakening and prices had to be further reduced.

In the Solingen cutlery and hardware industry unemployment again is extending and some firms are introducing short time. The tool industry lately is booking more orders, but prices are low and, on account of

(Concluded on page 1825)

Flow of Blast Furnace Gas in Large Mains

Determination of Cross-Section Factor by Means of Pitot Tubes—Quantity Varies as Fifth Power of Diameter

BY J. F. BARKLEY*

In designing pipe layouts for gas flow, the sizes of the lines are generally determined by the allowable pressure drops for given quantities of gas. A simple standard formula that is usually sufficiently accurate, and is readily applied, is expressed as follows:

$$Q = C \sqrt{\frac{d^3 h}{s L}}$$

Where Q = Quantity of gas in cu. ft. per hr.

d = Diameter of pipe in inches.

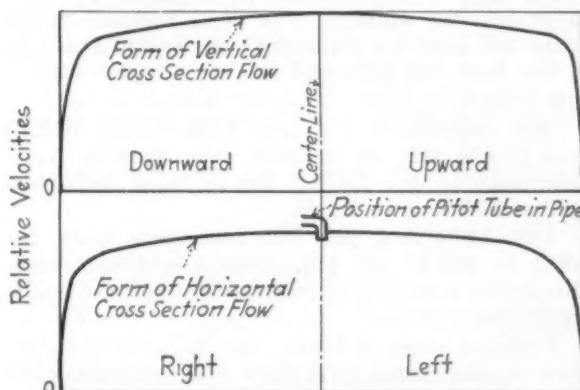
h = Pressure difference in inches of water between the points in the line.

s = Specific gravity of the gas, air being taken as unity.

L = Length of pipe in feet.

C = Constant determined by test.

The value of C varies considerably as given by different authorities. This might be expected, since it must embrace all the variables, not listed above, that



Curves Showing Relative Velocities of the Gas Along a Vertical and a Horizontal Center Line of a Cross Section of the Pipe. Ratio of the average velocity to that at the center equals 0.915

affect the flow of gas. It must take care also of any inaccuracies in the arrangement of the formula from a theoretical standpoint. W. Pole, who first presented the formula, gives the value of C as 2356; Molesworth gives 1732; J. P. Gill 2236, with a slight change in the formula, which value makes allowances for obstructions, etc., ordinarily found in old pipe; Clegg gives 1727. These values are given to apply to lines of relatively small diameter, say, below 18 in.

In order to determine the value of constant C as applied to large gas lines from 60 to 70 in. in diameter, the following tests were made. A horizontal blast furnace gas line was selected, having a straight run of about 175 ft. The line carried hot, dirty gas. It was brick lined with an inside diameter of about 65 in. The line had been in service but a few months and the brick work was first class.

The plan of the work was to measure the amount of gas flowing, by means of pitot tubes, and at the same instant to determine the drop in the gas pressure

*Fuel engineer United States Bureau of Mines; formerly assistant of the special engineering department, Edgar Thomson Works, Carnegie Steel Co.

between two points of the line. An equation for C was developed as follows:

For pitot tubes, one pointing upstream and one down stream.

$$Q = 3600 \times A \times K \times \sqrt{\frac{2 g h'}{1.37}}$$

Where Q = Quantity of gas in cu. ft. per hr.

A = Cross sectional area of pipe in sq. ft. = $\frac{\pi d^2}{4 \times 144}$

K = Cross section factor, or the ratio of the average velocity over the entire area, to the velocity at the point in the area where the pitot tubes were placed.

g = Acceleration of gravity.

h' = Height of gas in feet equivalent to pressure difference between the two tubes.

Let w = Weight of flowing gas in lb. per cu. ft.

h'' = Height of water column in inches of water held up by pressure difference between the two tubes.

$$\text{Then } Q = 3600 \times 0.854 \times A \times K \times 8.02 \times \sqrt{\frac{h'' \times 62.4}{12 \times w}}$$
$$= 306.6 \times K \times d^2 \sqrt{\frac{h''}{w}}$$

Equating this to the gas flow formula for which the constant C is to be derived, there results:

$$C \sqrt{\frac{d^3 h}{s L}} = 306.6 \times K \times d^2 \sqrt{\frac{h''}{w}}$$

$$\text{Or } C = 1112 \times K \sqrt{\frac{L}{d}} \times \sqrt{\frac{h''}{h}},$$

$$\text{as } s = \frac{w}{0.0761}$$

That is, C can be calculated from the cross section factor, the length and diameter of the line, the pressure difference shown by the pitot tubes, and the pressure drop of the gas between the two points.

In order to arrive at K , the cross section factor, it was necessary to determine the nature of the flow of the gas over the entire cross sectional area at the point in the line where the pitot tubes were to be placed. This was done by taking readings every 5 in. with a pair of pitot tubes moved across the horizontal and also the vertical center line of the area. To insure that the same total gas flow was occurring while these readings at different points were being taken, simultaneous readings were taken with a pair of stationary pitot tubes placed in the line.

The velocities thus found were plotted as ordinates to form the curves shown in the diagram. From the two curves for each pipe the ratio of the average velocity in the pipe to that at its center was calculated. A velocity measurement taken at the center of the pipe could then be corrected by the cross section factor to give the average velocity of gas flowing. The shape of these curves did not change appreciably for average gas velocities from 42 to 65 ft. per sec.

Factors L and d , the length and diameter of the

(Concluded on Page 1825)

Iron and Steel Markets

SUMMER QUIETNESS

Some Further Shrinkage in Demand and in Steel Production

Large Buying of Pig Iron at Chicago, with Prices Down \$1 a Ton

Another week has passed without signs of improvement in demand for steel or in the operation of rolling mills. In the Pittsburgh and related districts a further decline is indicated in both respects, while at Chicago reports agree that production is less. The general average for active steel capacity about Pittsburgh is 40 per cent, with Youngstown and Johnstown mills nearer 30 per cent. For the country the average is under 45 per cent.

The conditions of recent weeks are repeated in that pig iron is fairly active—though now in Western markets more than in the East, and with prices yielding further—and at the same time buyers of finished products show less need of steel. In this connection further curtailment in consuming industries has made it plain that stock replenishment will be for some time on a scale well below what was the rule in the first quarter of the year.

With the trade shaping its plans for a period of summer quiet, there is less disposition to press the issue as to prices. Concessions are expected and are made on exceptional tonnages, but on the general run the larger producers are sticking fairly close to the schedules represented in business now on their books.

Plates have been a yielding product for some time, and this week the Pittsburgh market is more definitely placed at 2.15c., a decline of \$1 a ton. The wire and nail trades are far short of their normal tonnage for the season, and prices vary by \$1 a ton, but there has been no general reduction. In sheets, irregularity is more marked, the differences amounting to \$2 and \$3 a ton on black and \$1 on galvanized and blue annealed.

A sale of 16,000 tons of line pipe for a Southern field is the most substantial development in the oil industry, and several other companies are considering new work. The jobbing pipe trade is dragging, however, as large stocks accumulated for spring work are yet to be moved.

After weeks of quietness in railroad equipment, there are inquiries for 1000 additional cars for a Missouri Pacific subsidiary, 3500 cars for Mexico and 40 locomotives for the New York Central.

A semblance of buoyancy in the structural steel field is due to the appearance of 50,000 tons of inquiries following 55,000 tons last week. Bookings, at 30,000 tons, including 18,300 tons for oil tank work, are the largest in nine weeks, for which the average has been 20,000 tons.

Railroad specifications for rails and track supplies continue quite below expectations and indicate that track work is not proceeding at a normal rate, in spite of the promise of some months ago that 1924 would be a great track year even though as to equipment it would fall below 1923.

Though the workers asked for advances, the bar iron scale was settled at Atlantic City for another year on the present basis. There was no dispute as to the decline in demand and in price.

An inquiry for 20,000 tons of oil well casing for Argentina, under specifications suiting mills of Continental Europe, is receiving little consideration by American producers.

A Japanese oil company is in the market for the equivalent of 14,250 base boxes of tin plate.

The pig iron buying by large interests in the past two weeks has extended into other districts, continued price declines suggesting a close approach to low point. At Chicago fully 75,000 tons has been sold for the third quarter at \$1 a ton under last week's market. Pittsburgh and Cleveland also have had more active markets, with a decline of 50c. a ton. The important development at Pittsburgh was the willingness of some furnaces to sell at the low level for delivery to the end of the year. In the East the principal sale was 15,000 tons of pipe iron.

May exports of pig iron from Great Britain were 75,750 tons, or one half more than in April. Shipments to the United States were 5355 tons against 100 tons in April.

THE IRON AGE pig iron composite price has fallen to \$20.13 per ton, from \$20.54 last week. This is the lowest in 26 months and compares with \$28.21 one year ago.

Finished steel is lower, due to a drop in the price of steel plates, THE IRON AGE composite price now being 2.603c. per lb., the lowest in 16 months. This compares with 2.610c. last week and with 2.789c. one year ago.

Pittsburgh

Decline in Production Activity Stayed—Reductions in Pig Iron and Plates

PITTSBURGH, June 17.—Steel business has shown no improvement in the past week, but the decline in the rate of operations, which was so rapid in May, has apparently been stayed; the percentage of productive capacity engaged remains this week about the same as in the first two weeks of June. The Carnegie Steel Co. continues on the active list, 27 out of its 58 blast furnaces, and its steel production this week will average about 60 per cent. The Jones & Laughlin Steel Corporation maintains a 60 per cent operation, the average being brought up somewhat by fairly good production of pipe and tin plate.

The general average of ingot production for Pittsburgh district probably does not exceed 40 per cent of

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron,	Per Gross Ton:	June 17, 1924	June 10, 1924	May 20, 1924	June 19, 1923
No. 2X, Philadelphia†	\$21.76	\$21.76	\$22.76	\$30.76	
No. 2, Valley furnace†	19.50	20.00	20.50	27.00	
No. 2, Southern, Cin'ti†	24.05	24.05	25.05	29.05	
No. 2, Birmingham, Ala.†	20.00	20.00	21.00	25.00	
No. 2 foundry, Chicago*	21.00	22.00	22.50	31.00	
Basic, del'd, eastern Pa.	21.00	21.00	21.00	28.14	
Basic, Valley furnace	19.50	20.00	20.00	27.50	
Valley Bessemer del'd P'gh	22.76	23.26	23.76	30.27	
Malleable, Chicago*	21.00	22.00	22.50	31.00	
Malleable, Valley	20.00	20.00	20.50	28.00	
Gray forge, Pittsburgh	21.26	21.26	21.76	28.27	
L. S. charcoal, Chicago	29.15	29.15	29.15	36.65	
Ferromanganese, furnace†	107.50	107.50	107.50	125.00	

Rails, Billets, etc., Per Gross Ton:

O.-h. rails, heavy, at mill	\$43.00	\$43.00	\$43.00	\$43.00
Bess. billets, Pittsburgh	38.00	38.00	38.00	42.50
O.-h. billets, Pittsburgh	38.00	38.00	38.00	42.50
O.-h. sheet bars, P'gh	40.00	40.00	40.00	42.50
Forging billets, base, P'gh	43.00	43.00	43.00	47.50
O.-h. billets, Phila.	43.17	43.17	43.17	50.17
Wire rods, Pittsburgh	48.00	48.00	48.00	51.00
Skelp, gr. steel, P'gh, lb.	2.20	2.20	2.25	2.45
Light rails at mill	1.90	1.90	1.90	2.25

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.42	2.42	2.47	2.72
Iron bars, Chicago	2.20	2.25	2.25	2.50
Steel bars, Pittsburgh	2.20	2.20	2.25	2.40
Steel bars, Chicago	2.25	2.25	2.25	2.60
Steel bars, New York	2.54	2.54	2.59	2.74
Tank plates, Pittsburgh	2.16	2.20	2.20	2.50
Tank plates, Chicago	2.35	2.35	2.40	2.80
Tank plates, New York	2.34	2.34	2.44	2.84
Beams, Pittsburgh	2.20	2.20	2.25	2.50
Beams, Chicago	2.35	2.35	2.45	2.70
Beams, New York	2.44	2.44	2.49	2.84
Steel hoops, Pittsburgh	2.75	2.75	2.75	3.30

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Sheets, Nails and Wire,	June 17, 1924	June 10, 1924	May 20, 1924	June 19, 1923
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.50	3.50	3.60	3.85
Sheets, galv., No. 28, P'gh	4.75	4.75	4.80	5.00
Sheets, blue an'Td, 9 & 10	2.75	2.75	2.80	3.00
Wire nails, Pittsburgh	2.90	2.90	2.90	3.00
Plain wire, Pittsburgh	2.65	2.65	2.65	2.75
Barbed wire, galv., P'gh..	3.70	3.70	3.70	3.80
Tin plate, 100-lb. box, P'gh	\$5.50	\$5.50	\$5.50	\$5.50

Old Material, Per Gross Ton:

Carwheels, Chicago	\$15.50	\$15.50	\$16.50	\$21.50
Carwheels, Philadelphia	17.00	17.00	17.00	23.00
Heavy steel scrap, P'gh	16.00	16.00	16.00	21.00
Heavy steel scrap, Phila.	15.00	15.00	14.50	18.00
Heavy steel scrap, Ch'go	13.50	13.50	14.00	17.50
No. 1 cast, Pittsburgh	17.00	17.00	18.00	23.50
No. 1 cast, Philadelphia	17.50	17.50	17.00	22.00
No. 1 cast, Ch'go (net ton)	16.50	17.00	17.50	21.50
No. 1 RR wrot, Phila.	16.50	16.50	16.50	23.00
No. 1 RR wrot, Ch'go (net)	11.50	11.50	12.00	15.50

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt	\$3.25	\$3.25	\$3.25	\$4.75
Foundry coke, prompt	4.50	4.50	4.75	5.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	12.75	12.87 1/2	13.12 1/2	15.37 1/2
Electrolytic copper, refinery	12.37 1/2	12.50	12.62 1/2	14.87 1/2
Zinc, St. Louis	5.85	5.82 1/2	5.77 1/2	6.00
Zinc, New York	6.20	6.17 1/2	6.12 1/2	6.35
Lead, St. Louis	6.95	6.95	7.00	6.95
Lead, New York	7.25	7.12 1/2	7.15	7.25
Tin (Straits), New York	44.75	42.00	40.50	40.25
Antimony (Asiatic), N. Y.	8.37 1/2	8.35	8.75	8.75

Composite Price, June 17, 1924, Finished Steel, 2.603c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe

These products constitute 88 per cent of the United States output of finished steel

June 10, 1924,	2.610c.
May 20, 1924,	2.639c.
June 19, 1923,	2.789c.

{ 10-year pre-war average, 1.689c.

Composite Price, June 17, 1924, Pig Iron, \$20.13 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

June 10, 1924,	\$20.54
May 20, 1924,	21.04
June 19, 1923,	28.21

{ 10-year pre-war average, 15.72

capacity. The Wheeling district is operating at about the same rate, while the Youngstown and Johnstown plants probably do not exceed 30 per cent. Only 11 of 45 open-hearth furnaces in the Youngstown district are producing.

The continued lack of interest among buyers has brought no marked changes in prices and the pressure which buyers exert to obtain concessions are not always successful, many of the mills preferring to wait a recovery of confidence. The only definite steel price reduction this week is on plates, which are now obtainable in this district at 2.15c., a decline of \$1 a ton. Reports of similar concessions on bars, shapes and wire products are common, but are difficult to confirm, and in fact are denied by some of the mills reported to have made such quotations.

Only in pig iron has there been a semblance of activity. Fairly substantial sales of foundry iron and of some basic have been made, the sales of foundry iron having brought the price down to \$19.50, furnace, for the base grade. It is somewhat surprising that two

or three furnaces were willing to make sales at that price for delivery over the entire second half. Basic is also obtainable at \$19.50, furnace, which is 50c. a ton under recent sales.

A further settling of furnace coke prices to \$3 per ton at ovens tells its own story of lack of demand, as production of beehive coke is also at minimum.

To the extent that sentiment plays its part in recovery from a depressed market, it may be said that the situation is somewhat brighter this week, but this condition is entirely a mental one, not having been reflected in any tangible way. In any appraisal of existing conditions the political situation is not to be ignored, and the belief is general, among sellers at least, that when the political conventions are out of the way there will be a tendency toward improvement. However, the most optimistic of those in the steel and iron trade here do not expect any substantial change for the better before August or early September.

Pig Iron.—The chief event of interest in the pig iron market this week is the purchase by the Westing-

house Electric & Mfg. Co. of 5400 tons of foundry iron of three different analyses for delivery to its Trafford, Pa., works over the second half. Not only did the several furnaces which shared the business go to \$19.50, furnace, for the base grade, but with possibly one exception they agreed to deliveries until the end of the year at this price. Whether furnaces will now make a firm stand at \$19.50 remains to be seen, but it is certain that the market is still very weak and further concessions would not be surprising. Sales of foundry iron by one company have exceeded 15,000 tons in the past week or ten days, while another office has sold about the same quantity, mostly basic. The basic iron brought better than \$20, furnace, but the transactions were somewhat of an inter-company affair and do not actually govern what might be done on open inquiries. Some sellers of basic intimate that they would quote \$19.50, furnace, on a desirable tonnage, and with foundry iron at this figure it does not seem that buyers would be willing to pay more. A radiator company has bought about 2000 tons of foundry iron for its western Pennsylvania plants and 2500 tons for its New Jersey plant. A 1000-ton lot of gray forge iron went at \$19.50, furnace. An ingot mold manufacturer is in the market for 1000 tons of Bessemer and same quantity of low phosphorus iron. Bessemer iron is now to be had at \$21, Valley furnace. The Canal Dover furnace of the M. A. Hanna Co. went out of blast on Sunday. The Shenango Furnace Co. will shortly bank its one active furnace for a week.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.75 per gross ton:	
Basic	\$19.50 to \$20.00
Bessemer	21.00 to 21.50
Gray forge	19.50 to 20.00
No. 2 foundry	19.50
No. 3 foundry	19.00 to 19.50
Malleable	20.00 to 20.50
Low phosphorus, copper free	28.00 to 29.00

Ferroalloys.—Due to the low rate of steel plant operations there is very little demand for ferroalloys, business being confined to occasional carload lots. Prices for both foreign and domestic ferromanganese remain unchanged at \$107.50, seaboard or furnace. Prices of other alloys will be found on page 1827.

Semi-Finished Steel.—The small amount of business in semi-finished steel has furnished no test of the market. Open hearth rerolling billets remain nominally at \$38, but there have been sales of discard billets, not guaranteed as to analysis, at liberal concessions. Forging billets take the usual \$5 a ton differential over rerolling quality. Some makers of wire rods are unwilling to listen to offers of less than \$48, and the demand is not important enough to determine whether a firm stand will be made at this price. Operations have not increased, being at about 40 to 45 per cent of capacity in this district. Prices will be found on page 1827.

Wire Products.—Business is extremely slow. Makers of wire and nails are carrying the stocks for jobbers, who are ordering small lots for rush shipment. One of the largest makers reports that the number of its orders is as large as during times of active demand, but the amounts are so small that the total tonnage falls far short of what might normally be expected at this time of year. Buyers have been making efforts to obtain concessions of 5c. per 100 lb. on nails and wire, but it is not apparent just how successful they have been, as some makers report they are holding firmly to \$2.90 per keg, base, on nails and to \$2.65 per 100 lb. on wire. Cement coated nails are nominally quoted at \$2.35, base, but some buyers say they have been quoted \$2.30. Mill operations in this district show no change, continuing at about 40 per cent of capacity. Prices are given on page 1826.

Steel Rails.—While quotations on light rails rolled from billets remain at 2c. for the small lots now being ordered, quotations of 1.90c. would no doubt be available on larger lots. The demand is very light.

We quote light rails, rolled from billets, 1.90c. to 2c. base (25-lb. to 45-lb.); rolled from rail steel, 1.75c. to 1.85c. base (12-lb. to 45-lb.), f.o.b. mill; standard rails, \$43 per gross ton mill, for Bessemer and open-hearth sections.

Tubular Goods.—Prospects are somewhat brighter for a resumption of sizable demand for oil country pipe. A sale of 16,000 tons of line pipe for the Southern oil field is the most important step in some time toward a revival of oil company buying. Several other oil companies are reported to be considering new work, which will require the buying of substantial quantities of line pipe. Specifications from jobbers are coming to the mills very slowly, as most jobbers still have fairly large stocks on hand, which they are trying to liquidate. The backwardness of the season has had its effect in slowing up the moving of stocks from jobbers' warehouses. In some sections there has been so much rain that several forms of building activity have been delayed. Despite the falling off in demand for pipe, this branch of the steel industry is still the most active of any, operations continuing at close to 70 per cent, with the leading interest running at a considerably better rate than the independents. Discounts are given on page 1826.

Sheets.—There has been no improvement in the demand for sheets, and a mill operation averaging about 45 per cent for the industry seems to take care of all current demands. The sheet trade is watching the automobile industry with interest in an effort to determine when a revival of demand may be expected from that source. Some of the automobile makers are working down their stocks of materials, including sheets, but the sales of cars have shown no important increase, due largely, it is believed, to the prevalence of cold, wet weather over a large section of the country at a time when automobile demand should have been at its height. Prices are still quite irregular, there being a spread of \$1 a ton on blue annealed and galvanized and \$2 or \$3 a ton on black sheets between the quotations named by some of the smaller independents and those of the larger independents and the leading producer. The range of quotations is given on page 1826.

Tin Plate.—The lateness of the crop season, a result of cold, wet weather over most of the fruit and vegetable producing area, has been almost entirely the cause of a slowing up in demand for tin plate. Can companies have all of their available storage space filled with manufactured cans, shipments of which to food packers have been held up because the early crops will be from three to four weeks late in maturing. In fact, it is expected that some of the early crops, such as early peas and tomatoes, will not be ready to harvest until the later crops have matured. This situation may cut down consumption of tin plate in some sections because of the inability of growers to harvest all of their crops in such a short season. The industry as a whole is averaging about 65 to 70 per cent operation, though one company is running at fully 90 per cent. Prices are firm at \$5.50 for production plate and at \$5.25 for stock plate. There is some easing in the price of tin mill black plate due to the desire of tin mills to dispose of some of their surplus. If there were any important demand it is certain that some mills would be willing to shade 3.75c. per lb.

Cold-Finished Steel Bars and Shafting.—One or two makers report a slightly better inquiry during the past week, but this is not the general situation, as others say that demand continues in about the same volume as that of recent weeks. Practically all makers quote 2.90c. on drawn or rolled bars and shafting, and in some instances this price has been given on less than carloads. Shafting, turned and polished, is to be had at 3c. to 3.10c. A leading producer of ground shafting has reduced its price, effective June 16, from 3.40c. to 3.30c. per pound for carload lots and to 3.55c. per pound for less than carload lots and to 4.30c. per pound for warehouse shipments.

Bolts, Nuts and Rivets.—While there have been no formal changes in the discounts or net prices on bolts, nuts and rivets, some makers offer concessions whenever there is the prospect of a desirable order. Under these conditions the published discounts are little more than a guide to the market, each purchase being subject to special negotiation, and the price depending on the size and character of the prospective order. Orders are

mostly small, and in the aggregate are not enough to give the industry more than a 50 per cent operation.

Track Supplies.—The new extras on spikes, published on page 1747 of THE IRON AGE of June 12, have not become generally effective, some makers in this district still adhering to the old set of extras. The new extras will have no effect on railroad purchases, which are almost wholly of the base sizes, which remain unchanged. Demand for track supplies is light, railroads having covered their requirements earlier in the year, and their general policy now seems to be to buy only for the most urgent needs. Prices will be found on page 1826.

Iron and Steel Bars.—Producers of steel bars are firmer in their belief that buying will not be stimulated by further price concessions, and to that extent the price of steel bars is slightly firmer at 2.20c., which is the quotation of nearly all mills. Demand has not increased. Bar iron prices are unchanged. Production of bar iron is on a 50 per cent basis. Prices are given on page 1826.

Structural Steel.—Most of the structural jobs being quoted on in this territory are small, but there is a slightly greater number of them than a few weeks ago. Fabricators are cutting prices closely in an effort to get business. Local mills are not inclined to go below 2.20c. on plain material. Prices are given on page 1826.

Plates.—Local mills quote 2.15c. on the larger lots of plates and 2.20c. on small lots, and this, they say, is as low as they care to go. These prices eliminate the mills of this district to a large extent in the East, where lower prices are quoted by Eastern mills, but there is no disposition to let that competition disturb them. Plate buying is largely restricted to unimportant orders. Prices will be found on page 1826.

Hot-Rolled Flats.—Hoops and bands are quoted at 2.75c. and hot rolled strips at 2.50c. to 2.75c., and considering the small volume of business these prices remain fairly stable. Mills are operating at about 50 per cent or slightly less, but consumers' stocks are light and it is expected that any turn for the better in business conditions generally will be quickly reflected in the demand upon the mills. Prices are given on page 1826.

Cold-Rolled Strips.—Stamping quality strip steel, cold rolled, is quoted at 4.50c., and such concessions as are being given are usually on strips for tubing. These are said to be no greater than the usual concessions to this class of trade. Orders are for small lots, and the total is just about enough to maintain a 50 per cent operating rate, which has been in effect for some weeks.

Coal and Coke.—Offerings of beehive coke have been made during the week at \$3 per net ton at ovens and sales have been made at this figure. It is doubtful whether any substantial tonnage could be purchased at this price, but furnaces are content to pick up carloads as they need them, and despite the drastic curtailment of coke production the supply seems to be larger than the demand. Foundry coke is offered at prices ranging from \$4.50 to \$5, with a majority of transactions at the lower figure. The coal situation remains dull, although some factors report a slight increase in buying interest, with no actual increase as yet in the volume of orders. We quote steam slack at \$1.10 to \$1.20 per net ton at mines; gas slack at \$1.20 to \$1.30; mine run steam coal, \$1.50 to \$1.75; mine run coking coal, \$1.75 to \$2, with some offers of slightly inferior grades as low as \$1.60, and mine run gas coal at \$2 to \$2.25.

Old Material.—Despite the absence of any important consumer demand the scrap market remains fairly firm at the prices quoted a week ago. Pittsburgh mills will not pay more than \$16 for heavy melting steel, but a mill outside of this immediate district is offering \$16.50. A Pittsburgh mill this week gave shipping instructions on a few thousand tons of steel scrap, bought some time at considerably above today's prices. There has been a little flurry in machine shop turnings, entirely among dealers, due to offers of \$13.50 to cover on orders soon expiring which were taken at less than this figure. A factor of encouragement to the

scrap trade is the willingness of consumers and dealers to pay above current market quotations for railroad scrap. The Norfolk & Western Railroad will take bids up to June 18 on close to 10,000 tons, a considerable part of which consists of short rails and iron carwheels. The Baltimore & Ohio is offering about 12,000 tons of materials, bids closing June 23.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

	Per Gross Ton
Heavy melting steel.....	\$16.00 to \$16.50
No. 1 cast, cupola size.....	17.00 to 17.50
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	16.50 to 17.00
Compressed sheet steel	14.50 to 15.00
Bundled sheets, sides and ends.....	13.00 to 13.50
Railroad knuckles and couplers.....	19.00 to 19.50
Railroad coil and leaf springs.....	19.00 to 19.50
Low phosphorus blooms and billet ends	20.00 to 21.00
Low phosphorus plate and other material	19.50 to 20.00
Railroad malleable	15.50 to 16.00
Steel car axles	19.00 to 19.50
Cast iron wheels	16.00 to 16.50
Rolled steel wheels	19.00 to 19.50
Machine shop turnings	13.00 to 13.50
Sheet bar crops	16.00 to 16.50
Heavy steel axle turnings	14.50 to 15.00
Short shoveling turnings	13.00 to 13.50
Heavy breakable cast	15.50 to 16.00
Stove plate	13.50 to 14.00
Cast iron borings	14.00 to 14.50
No. 1 railroad wrought	14.00 to 14.50
No. 2 railroad wrought	16.00 to 16.50

Scrap Market in Canada Quiet.

TORONTO, ONT.—While the general trend of business in the Canadian iron and steel scrap market appears to be taking a turn for the better, the demand for most commodities is still quiet. The shutting down of a large part of the plant of the Algoma Steel Corporation at Sault Ste. Marie, Ont., will have the effect of reducing the consumption of scrap there, but the Steel Co. of Canada, Hamilton, Ont., continues to take regular shipments of heavy melting steel and turnings, the demand for which is fairly good at present.

Consumers in general, however, are not coming forward with contracts for third quarter as freely as dealers expected, but a few fair contracts for this period have been closed. Foundries are buying in a conservative manner, though in slightly larger tonnages for immediate consumption. The demand for machinery cast scrap has improved during the past week or two; stove plate is moving in a better manner and small sales of car wheels have been reported for the week. In the Montreal district business in the scrap market is backward. Local consumers are not buying except for immediate consumption and exports of scrap from this locality are practically at a standstill. Trading between dealers at prices below market levels is reported, but buying of this nature is almost entirely speculative. Dealers' buying prices are as follows:

	Gross Tons	Toronto	Montreal
Steel turnings	\$9.00	\$8.00	
Machine shop turnings	9.00	8.00	
Wrought pipe	8.00	10.00	
Rails	12.00	13.00	
No. 1 wrought scrap	11.00	12.00	
Heavy melting steel	11.00	10.50	
Steel axles	14.00	18.00	
Axes, wrought iron	18.00	20.00	
	Net Tons		
Standard car wheels	13.00	14.00	
Malleable scrap	14.00	14.00	
Stove plate	15.00	15.00	
No. 1 machinery cast	17.00	19.00	

The number of electric hoists ordered during May show a decrease of 22.4 per cent and the value of orders a decrease of 27.45 per cent, as compared with April, according to records of the Electric Hoist Manufacturers Association, 165 Broadway, New York. Shipments during May decreased 9.86 per cent, as compared with April.

Members of the Cincinnati chapter of the American Society for Steel Treating were guests of the American Rolling Mill Co., Middletown, Ohio, at luncheon June 12, after which an inspection trip was taken through the company's plant.

Chicago

Revival in Pig Iron—Unexpected Buoyancy in Building Construction

CHICAGO, June 17.—Pig iron buying has shown a decided revival, but at the expense of prices which have declined another dollar. Finished steel, on the other hand, remains quiet, although inquiries are more numerous and bookings in some commodities have shown slight improvement. In fact, a leading interest reports that both new business and orders passed to entry were the best for any week in the past two months. It is hoped that this may prove to be a straw pointing to a steady betterment in buying during coming weeks.

Meanwhile, however, production has suffered a further decline and prices remain flexible. Shading continues to be reported in plates, bars and sheets and general reductions have taken place in bar iron and rail steel bars. Nevertheless sellers feel that the present low rate of buying cannot continue indefinitely, notwithstanding a reduced rate of consumption. Supplies in the hands of users are low, except in the automobile industry where stocks are in the form of finished product rather than raw materials. With the exhaustion of present supplies purchases will have to be made for replenishment purposes, in the same manner that buying finally developed in the pig iron market.

Whether the expected buying movement will be of sufficient scope to result in a recovery of prices is another question, in view of present inactivity on the part of some of the heaviest sources of steel consumption. The automobile industry, for example, is operating at 50 to 60 per cent and no present signs point to an early increase in that rate. Railroad specifications against rail and track supply contracts are considerably below expectations and freight car buying is almost nil. In well informed circles, however, it is strongly hinted that heavier equipment purchases and more liberal releases of rail and fastening tonnage may be expected later in the year. Building construction shows unexpected buoyancy, in view of recent indications pointing to receding activity. Fabricating awards for the week call for a round tonnage and new projects involve 23,000 tons. Lettings of oil storage tanks also have been of liberal proportions.

Mill operations in this territory do not average more than 50 per cent, although a few producers are doing better, notably a pipe mill which is still on a 75 per cent basis. Of the 30 steel works blast furnaces of the two leading mills, 14 remain in operation, one Gary furnace having been banked. Of the four furnaces of the smaller independent steel interests, one Wisconsin steel works stack also has been banked. Wire mill operations average 35 per cent, but the recent rise in the wheat market has revived hope for better business in wire goods.

Pig Iron.—A real buying movement is under way and it is estimated that fully 75,000 tons of iron has been sold in this market during the week. Most orders were confined to third quarter and were smaller than would be normally expected because of reduced melt. In the closing of this business prices suffered and local grades of foundry and malleable are now quotable at \$21, base furnace, while basic is even weaker. Considerable tonnage is still pending and it is the hope of producers that it will prove sufficiently large to stiffen the market, which, at present levels, is said to be below costs. A Michigan melter is inquiring for 2000 to 3000 tons of foundry iron for third quarter or 5000 tons for last half. A western Illinois user is in the market for 2000 tons of foundry for third quarter. There are numerous other inquiries ranging from 1000 tons down to 200 tons. Little Southern foundry iron is being sold in this territory, although we note the placing of 200 tons of high silicon material at \$20, base Birmingham. There was also a sale of 200 tons of Southern for barge and rail shipment at \$25.68, delivered. Reports of weakness in silvery have not been verified. A Michigan melter is inquiring for 2000

tons of silvery. A Milwaukee user wants a carload of low phosphorus. Charcoal sales have been confined to small lots.

Quotations on Northern foundry, high phosphorus, malleable and basic irons are f.o.b. local furnaces and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards or, when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sll. 1.50,	
delivered at Chicago	\$29.15
Northern coke, No. 1 sll. 2.25 to 2.75	21.50
Northern coke, foundry, No. 2, sll. 1.75 to	
2.25	21.00
Malleable, not over 2.25 sll.	21.00
Basic	\$20.00 to 21.00
High phosphorus	21.00
Southern No. 2	\$26.01 to 27.01
Southern No. 2 (barge and rail)	24.68
Low phos., sll. 1 to 2 per cent, copper free	30.50
Silvery, sll. 8 per cent	35.29
Electric ferrosilicon, 14 to 16 per cent	45.42

Ferroalloys.—An inquiry for 300 tons of ferromanganese has been withdrawn. All of the ferroalloys are quiet.

We quote 80 per cent ferromanganese, \$115.06, delivered; 50 per cent ferrosilicon, \$75, delivered; spiegeleisen, 18 to 22 per cent, \$42.56 to \$43.56, delivered.

Structural Material.—Excluding 18,000 tons of tank work, fabricating awards for the week amounted to nearly 7000 tons. New projects, also exclusive of tanks, aggregate 23,000 tons. The largest individual letting, new shops for the Santa Fe at San Bernardino, Cal., involved 3000 tons. The revival in structural activity is one of the few encouraging features of the iron and steel market, but it is still notable that fabricators are naming exceedingly low prices. Plain material prices have shown no further change.

The mill quotation on plain material is 2.35c., Chicago. Jobbers quote 3.20c. for plain material out of warehouse.

Plates.—Tank awards continue to be the feature of the market. The Marland Refining Co. has placed an order, subject to the completion of financing, for 40 oil storage tanks, involving 12,000 tons. These will be fabricated by the Chicago Bridge & Iron Works. The Standard Oil Co. of Louisiana has awarded tanks, requiring 3800 tons, to the Riter-Conley Co., while the Humble Oil Co. has placed 2500 tons of tankage with the Petroleum Iron Works Co. The steel in these two lettings will probably be rolled in the East. There have been no new developments in the railroad equipment field, although the Missouri Pacific is expected to take early action against its inquiry for 3000 cars. Car builders are releasing specifications against contracts very liberally. Miscellaneous plate buyers are evincing more interest in the market, but the price situation is still weak. Concessions of \$1 and \$2 a ton under the ruling quotation have been reported.

The mill quotation is 2.35c., Chicago. Jobbers quote 3.20c. for plates out of stock.

Bars.—Bookings in soft steel bars show some improvement, while inquiries are decidedly more numerous than for several weeks. Actual buying, however, is still insufficient to stabilize the market, and although 2.25c., Chicago, is generally adhered to, as low as 2.20c. has been reported. Demand for bar iron and rail steel bars continues to lag and prices have again sagged, bar iron having declined to 2.20c., Chicago, while rail steel has dropped to 2.10c., Chicago mill.

Mill prices are: Mild steel bars, 2.25c., Chicago; common bar iron, 2.20c. to 2.25c., Chicago; rail steel, 2.10c., Chicago mill.

Jobbers quote 3.10c. for steel bars out of warehouse. The warehouse quotations on cold-rolled steel bars and shafting are 3.90c. for rounds and 4.40c. for flats, squares and hexagons, 4.2c. for hoops and 3.75c. for bands.

Jobbers quote hard and medium deformed steel bars at 2.40c. to 2.45c., base; hoops, 4.45c.; bands, 3.95c.

Rails and Track Supplies.—Railroad specifications for rails and track supplies are considerably below expectations and indicate that track work is not proceeding at a normal rate for this season. In fact, some lines are reported to have stocked considerable tonnages of material. Railroad officers state, however, that they expect to take considerably more tonnage later in the year. Current inquiries include 10,000 kegs

of spikes, 3000 kegs of spikes and 1000 kegs of bolts. The New York Central expects to enter the market shortly for a large quantity of track fastenings.

Standard Bessemer and open-hearth rails, \$43; light rails, rolled from billets, 2.10c., f.o.b. makers' mills.

Standard railroad spikes, 3.10c. mill; track bolts with square nuts, 4.10c. mill; track tie plates, 2.60c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.65c. base, and track bolts, 4.65c. base.

Cast Iron Pipe.—Lettings are less numerous, but large new projects continue to come up for bids. Detroit will take figures June 27 on 2200 tons of 6-in. and 3150 tons of 8-in. Class B. Jackson, Mich., will receive tenders June 18 on 581 tons of 24-in., 247 tons of 20-in., 57 tons of 16-in. and 18 tons of fittings, all of it Class B. Hannibal, Mo., has awarded 700 tons to the National Cast Iron Pipe Co. Prices are unchanged.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$58.70 to \$59.70; 6-in. and over, \$54.70 to \$55.70; Class A and gas pipe, \$5 extra.

Sheets.—Buyers are showing more interest in the market, but actual orders are still few. The action of the Steel Corporation subsidiary in meeting independent competition brings prices down to a single level for most of the productive capacity of the country. Occasional concessions, however, indicate that there are still a few mills willing to sell at less than those prices.

Mill quotations are 3.65c. for No. 28 black, 2.80c. for No. 10 blue annealed, and 4.80c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote f.o.b. Chicago: 3.90c. for blue annealed; 4.70c. for black, and 5.60c. for galvanized.

Wire Products.—New business, while not equal to that of a week ago, is nevertheless better than the average for the past two months. The pressure of both jobbing and manufacturing consumers for shipments against these orders indicates that their stocks are exceedingly low. Wire mill operations average about 35 per cent. Mill prices, which are substantially unchanged, are shown on page 1826.

We quote warehouse prices f.o.b. Chicago: No. 6 to No. 9 bright basic wire, \$3.40 to \$3.75 per 100 lb.; extra for black annealed wire, 15c. per 100 lb.; common wire nails, \$3.60 to \$3.65 per 100 lb.; cement coated nails, \$3 per keg.

Reinforcing Bars.—With competition increasingly keen, the past week has brought out the lowest prices thus far this year. On sizable tonnages the maximum going quotation appears to be 2.40c., Chicago warehouse, while smaller lots are bringing up to 2.50c. and, in some cases, higher. Lettings are more numerous than a week ago, and a number of large projects are at the point of closing. Awards include:

General Electric Co. building, Detroit, 325 tons, to Joseph T. Ryerson & Son.

Cicero Avenue bridge, Chicago, 300 tons, to Kalman Steel Co.

St. Nicholas Hotel building, Springfield, Ill., 200 tons, to Concrete Engineering Co.

Tuller Hotel, Detroit, 110 tons, to McRae Steel Co.

Gymnasium building, Western State Normal School, Kalamazoo, Mich., 100 tons, to Concrete Steel Co.

South Dakota highway work, 100 tons, to Concrete Steel Co.

School building, Tipton, Iowa, 100 tons, to Concrete Steel Co.

R. H. Donnelley Corporation plant, Chicago, 400 tons of rail steel, to Inland Steel Co.

Pending work includes:

High school building, Kenosha, Wis., 300 tons.
Standard Sanitary Mfg. Co. warehouse, Milwaukee, 200 tons.

First National Bank building, Hammond, Ind., 500 tons.
Fraternal Order of Eagles, lodge building, South Bend, Ind., 150 tons.

H. E. Bell building, Chicago, 200 tons, general contract awarded to McLennan Construction Co.

Warehouse Prices.—Late today general reductions of \$2 or more a ton were announced by local jobbers. The new prices are to be noted under the various commodity paragraphs.

Rivets.—The market remains weak with small rivets quoted at 70 and 10 off, Chicago, and large rivets at \$2.85, Chicago.

Bolts and Nuts.—Current business is light and few contracts for third quarter have been closed. In the absence of buying prices are still very erratic. While most sellers are quoting 60 and 20 off, Chicago, for large machine bolts, sharp concessions below that figure have been reported.

Jobbers quote structural rivets, 3.65c.; boiler rivets, 3.85c.; machine bolts up to $\frac{1}{2}$ x 4 in., 60 per cent off; larger sizes, 60 off; carriage bolts up to $\frac{1}{2}$ x 6 in., 55 off; larger sizes, 55 off; hot pressed nuts, squares and hexagons, tapped, \$4 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 per cent off.

Old Material.—Actual consumer buying is still exceedingly light, but sentiment among dealers has improved, as evidenced by higher bids on recent railroad offerings. Further orders from the large steel interests are anticipated, not because of any great need for material, but because scrap at present prices is regarded as a good buy. Prices show little change, although malleable and cast grades are weaker, possibly because of the further decline of pig iron. Railroad lists include the Chesapeake & Ohio, 12,000 tons; the Rock Island, 3800 tons; the Wabash, 3100 tons; the Soo Line, 900 tons.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton
Iron rails	\$16.50 to \$17.00
Cast iron car wheels	15.50 to 16.00
Relaying rails, 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65 lb. and heavier	27.00 to 32.00
Forged steel car wheels	16.50 to 17.00
Railroad tires, charging box size	17.00 to 17.50
Railroad leaf springs, cut apart	17.00 to 17.50
Rails for rolling	14.75 to 15.25
Steel rails, less than 3 ft.	16.00 to 16.50
Heavy melting steel	13.50 to 14.00
Frogs, switches and guards cut apart	13.50 to 14.00
Shoveling steel	13.25 to 13.75
Drop forge flashings	9.50 to 10.00
Hydraulic compressed sheets	10.00 to 10.50
Axle turnings	11.00 to 11.50
Steel angle bars	15.00 to 15.50
Steel knuckles and couplers	16.50 to 17.00
Coll springs	18.00 to 18.50
Low phos. punchings	15.00 to 15.50
Machine shop turnings	7.00 to 7.50
Cast borings	10.00 to 10.50
Short shoveling turnings	10.00 to 10.50
Railroad malleable	16.50 to 17.00
Agricultural malleable	16.00 to 16.50

	Per Net Ton
Iron angle and splice bars	15.50 to 16.00
Iron arch bars and transoms	16.50 to 17.00
Iron car axles	23.00 to 23.50
Steel car axles	16.00 to 16.50
No. 1 busheling	9.00 to 9.50
No. 2 busheling	7.00 to 7.50
Pipes and flues	8.00 to 8.50
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	12.00 to 12.50
No. 1 machinery cast	16.50 to 17.00
No. 1 railroad cast	15.50 to 16.00
No. 1 agricultural cast	15.50 to 16.00
Locomotive tires, smooth	14.75 to 15.25
Stove plate	13.50 to 14.00
Grate bars	13.00 to 13.50
Brake shoes	13.00 to 13.50

A civil service examination for engineering draftsman has been announced by the United States Civil Service Commission, Washington, to fill a vacancy in the Bureau of Mines, Department of the Interior, for duty at Taft, Cal. Application blanks may be obtained on application at the post office or custom house in any city.

The H. B. Smith Co., Westfield, Mass., heating appliances, employing 1100 hands and heretofore operating full, has placed its radiator foundry on a four day per week schedule, and its boiler plant on five days. The management plans gradually to open its new foundry. Indications point to a brisk business next fall.

A foundry cost system is the subject of a 14-page pamphlet issued by the National Association of Cost Accountants, 130 West Forty-second Street, New York, for sale at 75 cents a copy. It covers a system the plan of which is issued by permission of the Machinery Builders' Society, 50 Church Street, New York.

New York

Pig Iron Buying Includes 15,000 Tons of Pipe Iron—Structural Steel Still Active

NEW YORK, June 17.—The week has not been marked by the activity of the previous one in pig iron and yet it has had its quota of business and quite a little is pending. Current transactions for the most part represent buying by large interests which have been able to get concessions from one furnace company or another. In New England inquiries amounting to 6500 to 7000 tons for a textile machinery foundry are not yet known to have been closed, though a part of the tonnage may be placed this week. Some close competition from Buffalo is reported in this case. A New Jersey foundry is reported to have bought 2000 tons of the third quarter, largely from an eastern Pennsylvania producer. The General Electric Co.'s recent purchases for its New England and Bayonne shops are put at about 2500 tons. A considerable purchase of pipe foundry iron has been made, the amount being estimated around 15,000 tons. Scattered buying of lots of 200 to 400 tons is represented in the week's total, one purchase including iron from India. Recent importations included a cargo of French iron which was rejected because of high sulphur. In general, the foundries which buy in ordinary lots are waiting for improvement in the demand for castings before taking on more pig iron. Special interest is shown in the Eastern market in the extent to which Buffalo iron has been available for shipment into New England at a concession from the \$19 Buffalo basis. Thus far it has not been established that the \$18.50 price or somewhat lower, named recently on Buffalo iron to be shipped into Ohio, has been duplicated in the East.

We quote delivered in the New York district as follows, having added to furnace price \$2.27 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.44 from Virginia:

East. Pa. No. 1X fdy., sil. 2.75 to 3.25	\$23.77 to \$24.27
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	23.27 to 23.77
East. Pa. No. 2, sil. 1.75 to 2.25..	22.77 to 23.27
Buffalo, sil. 1.75 to 2.25.....	23.91 to 24.41
No. 2X Virginia, sil. 2.25 to 2.75..	31.44
No. 2 Virginia, sil. 1.75 to 2.25..	30.44

Ferroalloys.—There are inquiries for several lots of ferromanganese, including two of 100 tons each, and one of 50 and 40 tons each, besides some carload lots. There have been sales of a few carload and smaller lots. In spiegeleisen, inquiry and sales are confined to a carload lot now and then. Prices for both materials are unchanged and firm.

Cast Iron Pipe.—The market continues quiet except for a small demand from privately owned water and gas companies in the vicinity of New York. Municipal governments in New England show little inclination as yet to come into the market for requirements. Actual prices are difficult to establish, as tonnages involved in transactions at present are small. While European pipe continues on a competitive basis, no further sales of any size are reported. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, \$60.60 to \$61.60; 4-in. and 5-in., \$65.60 to \$66.60; 3-in., \$75.60 to \$76.60, with \$5 additional for Class A and gas pipe. Business in soil pipe is practically at a standstill. Makers are working from one week to the next and jobbers seem inclined to wait as long as possible before replacing stocks. We quote discounts of both Southern and Northern makers, f.o.b. New York, as follows: 6-in., 34½ to 35¾ per cent off list; heavy, 44½ to 45% per cent off list.

Warehouse Business.—Purchases from stock are still confined to small lots. Demand for structural material is particularly light at present. The market on black and galvanized sheets continues fairly strong, although one large seller in this district, effective June 16, has reduced the schedule of quotations 10c. per 100-lb., which brings black sheets to a base price of 4.75c. per lb. and galvanized to a base of 5.75c. per lb. This reduction about represents the maximum concessions that have lately been made in some quarters. A slight tendency to shade prices of structural material is also

reported, but as yet it has apparently had but little effect in lowering the market. As much as \$2 per ton reduction from the current price schedule is said to have been done. European material, which some warehouses in this district have in stock, is reported to have been offered at as low as 2.35c. per lb. The market on bolts and screws is weak and discounts higher. Demand for pipe is light, but in view of continued building for much of which the pipe has not been purchased, sellers look forward to continued activity well into the summer. We quote prices on page 1846.

Finished Iron and Steel.—Developments are without significance, inquiries and bookings remaining at substantially the levels of recent weeks. Chief promise lies in continued building operations. Railroad bridge work has not come up to expectations, but will continue a factor, it is believed. Delivered prices, commonly figured to a Pittsburgh basis, show great variations due to the sellers giving the buyer some of the advantage in the transportation charge, arising out of the favorable location of the mill with respect to the point of delivery. Such is believed to be the case in the closing of 1440 tons of plates and 960 tons of shapes to be supplied by the Bethlehem Steel Co. for six ferry boats. Besides the general run of structural steel inquiries, it is to be remembered more than 10,000 tons for subway work in New York has been held up pending a change on July 1 in the control of municipal transportation construction. It is expected that much, if not all, of this will be readvertised. School work in New York is going on apace. Fabricators in the East are well booked. In steel bars concrete work continues the promising factor.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.54c.; plates, 2.34c. to 2.44c.; structural shapes, 2.44c. to 2.59c.; bar iron, 2.44c.

Coke.—Prices show no tendency to stiffen and standard foundry is still available at \$4.25 to \$4.75 per ton and standard furnace at \$3.50 to \$4 per ton. Curtailment of production has not as yet had any appreciable effect. By-product is unchanged at \$10.41, Newark and Jersey City, N. J.

Old Material.—Decidedly more strength on practically all grades is evident this week, but there is some doubt that this condition will endure for any length of time. But little new buying is noted, much of the present strength being attributed to a return of confidence to brokers and dealers filling contracts. As high as \$15.50 per ton delivered is being paid on shipments of railroad quality of heavy melting steel to Pottstown, Pa., and Claymont, Del. Steel of railroad quality shipped to other eastern Pennsylvania consumers is being bought at \$14.50 to \$15 per ton and No. 1 heavy melting steel, which has been quoted at \$13.50 per ton, delivered to a Harrisburg consumer, is now being bought at \$14 per ton delivered. Borings and turnings are bringing from \$11.50 to \$12 per ton, delivered eastern Pennsylvania, and specification pipe is substantially unchanged at about \$14 to \$14.25 per ton delivered, with some dealers paying as high as \$14.50 per ton. Machine shop turnings are somewhat firmer this week. Stove plate is unchanged at \$13.75 per ton, delivered, to a New Jersey consumer with a \$2.02 per ton freight rate.

Buying prices per gross ton New York follow:		
Heavy melting steel, yard	\$10.25 to \$10.75	
Steel rails, short lengths, or equivalent	11.25 to 11.75	
Rails for rolling	14.00 to 14.50	
Relaying rails, nominal	24.00 to 25.00	
Steel car axles	16.00 to 17.00	
Iron car axles	23.00 to 24.00	
No. 1 railroad wrought	14.50 to 15.00	
Forge fire	8.50 to 9.00	
No. 1 yard wrought, long	13.50 to 14.00	
Cast borings (clean)	8.75 to 9.25	
Machine-shop turnings	8.25 to 8.75	
Mixed borings and turnings	7.75 to 8.25	
Iron and steel pipe (1 in. diam., not under 2 ft. long)	10.25 to 10.75	
Stove plate	10.75 to 11.75	
Locomotive grate bars	11.50 to 12.50	
Malleable cast (railroad)	14.00 to 14.50	
Cast iron car wheels	13.50 to 14.00	

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:		
No. 1 machinery cast	\$15.00 to \$15.50	
No. 1 heavy cast (columns, build- ing materials, etc.), cupola size	13.00 to 13.50	
No. 1 heavy cast, not cupola size	10.00 to 10.50	
No. 2 cast (radiators, cast boil- ers, etc.)	12.00 to 12.50	

Boston

Fresh Weakness in Pig Iron Developed the Past Week

BOSTON, June 17.—Fresh weakness in pig iron developed the past week. An eastern Pennsylvania furnace, which a short time ago disposed of a limited tonnage at \$20.50, furnace, base, and then advanced its price \$1.50, has again sold several thousand tons at \$20.50. Steel mills in that territory offer attractive tonnages at low prices. Buffalo furnaces offer low silicon iron at less than \$19, but maintain full prices on No. 1X and higher silicones. One furnace in that district, heretofore on a \$20 base, has booked several thousand tons at \$19, furnace, for No. 2 plain and No. 2X and \$19.50 for No. 1X, 2000 tons No. 2X going to a central Massachusetts machinery maker. The H. B. Smith Co., Westfield, Mass., purchase did not go through on schedule, but possibly will be made tomorrow. Several thousand tons No. 2 plain iron are involved. Buffalo iron is offered that firm for considerably less than \$19, furnace. Notwithstanding the weakness in the market, iron is selling at comparatively high prices, for mixture purposes, but in small lots. Recent sales include northern New York No. 2X at \$20.50, furnace; central Pennsylvania No. 1X at \$23; Buffalo silicon, 3.25 to 3.75, at \$23.50; and Lake charcoal, silicon 3.00 to 4.00, at \$29. A sale of 580 tons of Norway No. 2X iron to a textile machinery manufacturer is reported. Details are lacking. Foreign iron otherwise is inactive.

We quote delivered prices on the basis of the latest reported sales as follows, having added \$3.65 freight from eastern Pennsylvania, \$4.91 from Buffalo, \$5.19 from Virginia and \$9.60 from Alabama:
East. Penn., sil. 2.25 to 2.75....\$24.65 to \$25.65
East. Penn., sil. 1.75 to 2.25....24.15 to 25.15
Buffalo, sil. 2.25 to 2.75.....23.66 to 24.41
Buffalo, sil. 1.75 to 2.25.....23.66 to 24.41
Virginia, sil. 2.25 to 2.75.....30.42 to 31.42
Virginia, sil. 1.75 to 2.25.....29.92 to 30.92
Alabama, sil. 2.25 to 2.75.....31.10
Alabama, sil. 1.75 to 2.25.....30.60

Coke.—It now develops that some of the largest consumers are taking Connellsville foundry coke more freely than generally realized. High test Connellsville fuel has been and is being purchased at delivered prices \$1 to \$2 a ton under prices quoted by New England by-product coke makers. Specifications against New England fuel contracts so far this month make a poor showing. Both the New England Coal & Coke Co. and the Providence Gas Co. quoted by-product foundry coke at \$12 delivered within New England.

Finished Material.—Consumers continue to buy steel mill products only as required. Practically no stocking of material is going on. Competition for business among mills is keen, consequently prices continue unsettled. Although 2c. is the prevailing price on plates, 1.95c. has been done recently even on small tonnages. Mills openly quote shapes at 2.15c., Pittsburgh, but privately have shaded that figure. The market for bars is 2.15c. to 2.25c. The Boston Elevated Railway Co. has placed 20 passenger cars with the Laconia Car Co., Laconia, N. H., five with the Osgood-Bradley Car Co., Worcester, Mass., and 25 with the J. G. Brill Co.

Soft steel bars, \$3.51 $\frac{1}{2}$ per 100 lb. base; flats, \$4.40; plain and deformed concrete bars, \$3.76 $\frac{1}{2}$; small angles, channels and tees, \$3.51 $\frac{1}{2}$; structural steel, large angles and beams, \$3.61 $\frac{1}{2}$; tire steel, \$4.80 to \$5.15; open-hearth spring steel, \$5 to \$8; crucible spring steel, \$12; steel bands, \$4.31 $\frac{1}{2}$ to \$5.20; hoops steel, \$5.80 to \$6.30; cold-rolled steel, \$4.35 to \$4.85; toe calk steel, \$6.15; heavy plates, \$3.61 $\frac{1}{2}$; light plates, \$3.86 $\frac{1}{2}$; diamond pattern plates, stock sizes, \$5.90; blue annealed sheets, \$4.51 $\frac{1}{2}$; refined iron bars, \$3.51 $\frac{1}{2}$; best refined iron bars, \$4.75; Wayne, \$5.50; Norway rounds, \$6.60; Norway squares and flats, \$7.10.

Old Material.—Slightly more heavy melting steel is moving in this territory, especially for New England consumption. A Worcester, Mass., mill is the heaviest buyer, paying around \$13.50 delivered. Turnings for steel mill use also are more active. Prices for them as well as for heavy melting steel are firmer. Dealers are urging owners of most other kinds of material to hold off, pending anticipated higher prices. Rejections of heavy melting steel by Pennsylvania mills as well as by New England consumers are again reported. The

American Brake Shoe & Foundry Co. has purchased its stove plate requirements, consequently prevailing market quotations are largely nominal. A little No. 1 machinery cast has sold at \$21.50 a ton delivered. Less desirable cast fetched but \$19. Practically no demand for malleable exists.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$19.00 to \$21.50
No. 2 machinery cast.....	17.50 to 18.00
Stove plates	14.50 to 15.00

Railroad malleable 16.00 to 16.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$10.50 to \$11.00
No. 1 railroad wrought.....	12.50 to 13.00
No. 1 yard wrought.....	11.50 to 12.00
Wrought pipe (1-in. in diam., over 2 ft. long).....	9.50 to 9.75
Machine shop turnings	7.50 to 8.00
Cast iron borings, chemical	9.00 to 9.50
Cast iron borings, rolling mill.....	8.00 to 8.25
Blast furnace borings and turnings	7.00 to 7.50
Forged scrap and bundled skeleton	7.00 to 8.00
Shafting	15.00 to 15.50
Street car axles	15.00 to 15.50
Rails for rolling	11.50 to 12.00

Buffalo

Round Lots of Pig Iron Under Inquiry and Less Price Divergence

BUFFALO, June 17.—A continuance of the run of business of the previous week is noted, though some furnaces which had announced themselves as on a \$20 base while competitors were doing less have been compelled to make concessions. This weakening on the part of the higher-priced makers has been accompanied by a firming on the part of the producers making the lower prices, so that the market is not so high or as low as it was. Three makers are now quoting \$19.50 on No. 2 plain, 1.75 to 2.25 silicon, and one is asking \$19.75 to \$20. The total inquiry runs as high as 20,000 tons, though some of these are from remote points and will not come here. A district melter is seeking 5000 to 10,000 tons of high silicon foundry iron; the General Electric Co. is asking bids on 2300 tons of high silicon foundry for the third quarter. There is a 2500-ton inquiry for 1.75 to 2.25 per cent silicon foundry from the East, a 1000-ton foundry inquiry from New England, and some 500-ton inquiries. One maker reports its sales during the past week at 15,000 to 20,000 tons. The sale of 1000 tons of basic to a Cortland buyer, reported last week at \$18.85, is confirmed at a price of \$18.85 to \$19. The Rogers-Brown Iron Co. has banked another furnace, leaving two in blast.

We quote f.o.b., gross ton, Buffalo, as follows:

No. 1 foundry, sil. 2.75 to 3.25....	\$20.00
No. 2 foundry, sil. 2.25 to 2.75....	19.50 to 20.00
No. 2 plain, sil. 1.75 to 2.25.....	19.50
Basic	19.00
Malleable	19.50
Lake Superior charcoal.....	29.28

Warehouse Business.—Quietness prevails, with price changes in prospect, but probably not to be actually completed until next month. A small flurry has occurred in plates, resulting in better business and structural shape bookings are running better. Bars, sheets and shafting are quiet.

Finished Iron and Steel.—Indications are that inventories in all steel products are pretty well depleted, but business conditions are so uncertain that little real buying is resulting. Tin plate users, for instance, are uncertain of future business and do not know just how to order. Most of the canners have covered for last half requirements, but other tin plate users have not covered so completely. In the main the last half contracting is lighter than during the first half. Bar market is comparatively inactive with 2.20c., Pittsburgh basis, prevalent. Fair specifications are coming in on sheets, with black price ruling firm at 3.65c. Among the orders taken during the week was one for 500 tons of black sheets which is believed to have been placed at a price somewhat lower than 3.65c. Plate price is about 2.20c., but Eastern competition in this district has offered tonnage at 2.15c. Pipe specifications are better. A Buf-

falo fabricator has obtained an order for 450 tons of power transmission tower work, and 200 to 300 tons of steel for road work will be let later this week.

We quote warehouse prices, Buffalo, as follows: Structural shapes, 3.65c.; plates, 3.65c.; soft steel bars, 3.55c.; hoops, 4.65c.; bands, 4.35c.; blue annealed sheets, No. 10 gage, 4.30c.; galvanized steel sheets, No. 28 gage, 6.10c.; black sheets, No. 28 gage, 5c.; cold-rolled and round shafting, 4.45c.

Old Material.—The market is almost at a standstill. One large mill here is buying a little heavy melting steel, but spasmodically and in small lots. While tonnage could hardly be bought at so low a figure, these small lots can be picked up at \$13.50. This mill has also bought some 200-ton lots of No. 1 busheling at \$12. Fifteen dollars is being offered on old orders for another mill by dealers. Pittsburgh district has supplied a small demand for turnings and borings. This district is paying \$13.50, Pittsburgh, for machine shop turnings and \$14, Pittsburgh, for cast iron borings.

We quote f.o.b. gross ton, Buffalo, as follows:

Heavy melting steel.....	\$13.50 to \$14.50
Low phos., 0.04 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	12.50 to 13.00
Car wheels.....	17.50 to 18.00
Machine shop turnings.....	10.00 to 10.50
Cast iron borings.....	12.00 to 12.50
No. 1 busheling.....	12.00 to 13.00
Stove plate.....	15.00 to 16.00
Grate bars.....	14.50 to 15.00
Bundled sheets.....	8.00 to 9.00
Hydraulic compressed.....	13.50 to 14.00
Railroad malleable.....	18.00 to 18.50
No. 1 machinery cast.....	16.50 to 17.50

Birmingham

Further Recessions in Pig Iron Production— Cast Pipe Business Good Through August

BIRMINGHAM, June 17.—The program of meeting squarely the law of supply and demand is apparently to be lived up to by Southern furnace interests. A second blast furnace has been blown out, the Sloss-Sheffield Steel & Iron Co. closing down its No. 6 stack at Sheffield. The Woodward Iron Co. started the ball rolling with its Vanderbilt furnace. The sales of pig iron continue in small lots and the aggregate of business still is unsatisfactory. The recent sale of 20,000 tons of iron to the United States Cast Iron Pipe & Foundry Co., two interests dividing the business equally, and a sale of 5000 tons to the American Radiator Co. did not stimulate the market much, for the program outlined as to curtailing production is being put into execution. The quotations for pig iron range between \$20 and \$21 per ton for No. 2 foundry. Two companies insist that they are selling at the higher price. Consumers are asking for further concessions. The cast iron pipe interests, pressure pipe makers, and the radiator works are the more active melters of iron and their trade appears assured through August at least. All small lot business is of the spot character. The larger tonnages mentioned will be delivered during the four months following the sale. The sentiment against piling iron is shown in tentative plans to close down two more furnaces. A change for the better is looked for when the political conventions have passed into history. Stove foundries are buying but little iron, waiting a resumption in their business.

We quote per gross ton f.o.b. Birmingham district furnace as follows:

No. 1 foundry, 2.25 to 2.75 sif.....	\$20.50 to \$21.00
No. 2 foundry, 1.75 to 2.25 sif.....	20.00 to 21.00
Basic	21.50
Charcoal, warm blast.....	31.00

Steel Mill Operations.—The plants of the Tennessee Coal, Iron & Railroad Co. and the Gulf States Steel Co. are still making steel, but in lessened quantities. The first is at a pace above 85 per cent while the Gulf States has two of its six open-hearth furnaces in operation. Structural steel industry is taking on a little impetus and prominent men in trade assert that more business is in sight and several specifications are being bid on. Concrete bars are still finding a steady market.

Cast Iron Pipe.—Lettings received by the cast iron

pipe manufacturers of this district in gas and water pipe are showing a let-down. The pace which was set the first three months of the year is not being continued. Production activity is assured through August. Interest is manifested in the new centrifugal pipe manufacturing methods, sounded out several months ago by the American Cast Iron Pipe Co., and engineers throughout the country are watching the progress of the development. Concessions on quotations have been reported.

We quote class B, 4-in. water, \$52 to \$53; 6-in. and over, \$48 to \$49; class A, \$5 higher; standard soil pipe, \$60; heavy gage, \$45; standard fittings, \$110.

Coke.—The coke market in Alabama holds the unique position of being steady as compared to conditions for the past six weeks and longer. The demand warrants a steady production and no deflection is announced as yet. The quotations are weaker, \$6 being the maximum price now heard with 50c. under that being possible on foundry coke, both by-product and beehive. Production this year will hardly be up to that of last year in Alabama, 4,689,641 tons, except there be unusual activity during the last half of the year. Alabama produced 3,760,064 tons in 1922. Despite the lagging conditions at many foundries and pipe shops and the reduction in pig iron production, anticipations are that the coke production will continue steady. Independent coke producers are satisfied with prospects.

Scrap.—Consumers of scrap iron and steel are practically making their own price where there is any buying. The list of quotations given is but a trading basis so to speak. Heavy melting steel has as quiet a market as ever seen. Birmingham old material dealers have a limited market for the greater portion of their products, the territory including only Chattanooga and Knoxville to the north of here and hardly any distance to the south. All scrap yards are in good shape.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Cast iron borings, chemical.....	\$15.00 to \$16.00
Heavy melting steel.....	13.00 to 14.00
Railroad wrought	11.50 to 12.00
Steel axles	17.00 to 18.00
Iron axles	19.00 to 20.00
Steel rails	13.00 to 14.00
No. 1 cast.....	17.00 to 18.00
Tram car wheels.....	15.50 to 16.00
Car wheels	15.00 to 15.50
Stove plate	14.00 to 15.00
Machine shop turnings.....	5.00 to 6.00
Cast iron borings.....	6.50 to 7.00
Rails for rolling.....	15.50 to 16.00

San Francisco

More French and Belgian Pig Iron Comes in Building Still a Good Factor

SAN FRANCISCO, June 11.—While general trade conditions cannot be called active there is quite a steady movement in iron and steel, limited though it is to small lots, with only an occasional order of liberal size. Buying still shows hesitancy, but numerous small orders serve to make up substantial totals and from this viewpoint business is in better condition than it was a month ago. New orders for some classes of material are not as large as earlier in the year, but the new work then contracted for was of sufficient volume to keep everybody busy into the third quarter. As one well known mill representative remarked: "If we can keep that far ahead of our business during periods of comparative quiet, we have no cause for complaint." Building continues steady in the larger cities, particularly in the central portion of the State and in the immediate vicinity of Los Angeles. Steel plants are operating at close to 70 per cent capacity and that, under all conditions, is considered satisfactory.

Pig Iron.—Many of the inquiries of the past month are developing into orders and importers say the indications seem to be favorable for increased buying rather than otherwise for some time to come. A factor in the local market is the increasing use of French

and Belgian iron. Recent sales have been at \$27.50 to \$29 per ton, duty paid. Late arrivals aggregate over 3000 tons and there is a considerable amount now on the way. The demand for English and Scotch irons remains steady. It is reported that two good sized cargoes have been sold for future delivery at \$30.50 per ton, duty paid. Some iron from eastern Asia has come in and additional imports from that quarter are planned.

Coke.—Arrivals thus far have not been much above normal for this part of the year but it is noticeable that foreign tonnage engaged for coke cargoes shows a substantial increase. Importers say that inquiries indicate a little better interest and tonnage is usually all sold either before or immediately upon arrival. The price asked for foreign grades is still \$18 per ton, duty paid.

Finished Steel and Iron.—Prices have been shaded in some lines and trading continues rather moderate except for structural and reinforcing materials. Recessions in price have not been marked. In merchant bars several orders involving some 1100 tons in the aggregate have been booked at 2.75c., a slight reduction from the price of a month ago. There are pending inquiries for about 3500 tons of reinforcing bars, but whether it will all be awarded now or one half of it later is not yet determined. Plates are selling slowly and prices are easier, some business being placed at 2.50c. c.i.f. coast ports.

Old Material.—Although business remains quiet, there is a little more activity than for some weeks past. Both mills and foundries buy very sparingly and even the late reduction in prices had little effect as a stimulant. The market is fairly steady at \$12 to \$12.50 per ton for heavy melting steel and other grades are weak with no values sufficiently fixed for a quotation. A cargo of 1860 tons arrived from Callao during the past week, and it is nearly all spoken for. Another cargo is reported on the way from the South American coast to San Pedro, and it is already placed with Los Angeles mills.

St. Louis

Foundry Iron Orders Scarce and Plants Curtailing—Steel Fabricators Expectant

ST. LOUIS, June 17.—The principal transaction in pig iron during the week was the sale of 1000 tons of foundry iron to an East Side melter by the St. Louis Coke & Iron Co., which also sold 700 tons in carloads up to 100 tons. A St. Louis machinery manufacturer bought 300 tons of foundry iron. The order for 16,000 tons of iron for a radiator manufacturer for plants in this district went to Chicago, the local makers reporting that the price offered was too low. An Illinois boiler manufacturer is in the market for 2400 tons of foundry iron for third quarter delivery, and a furnace manufacturer in southern Illinois wants 300 tons of foundry iron for last half shipment. Several melters in the district are curtailing operations and a few instances are reported of plants being closed down for lack of orders. The St. Louis Coke & Iron Co. has reduced its price to \$22 to \$22.50, f.o.b. Granite City, while Northern iron at \$22, Chicago, and Southern at \$20 to \$21, Birmingham, are unchanged. All quotations are nominal.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.16 freight from Chicago, \$3.28 from Florence and Sheffield (rail and water), \$5.17 from Birmingham, all rail, and 81c. average switching charge from Granite City:

Northern fdy., sll. 1.75 to 2.25	\$24.16 to \$26.16
Northern malleable, sll. 1.75 to 2.25	24.16 to 25.16
Basic	24.16 to 25.16
Southern fdy., sll. 1.75 to 2.25 (rail)	25.17 to 26.17
Southern foundry, sll. 1.75 to 2.25 (rail and water)	23.28 to 24.28
Granite City iron, sll. 1.75 to 2.25	22.81 to 23.31

Coke.—A few scattering inquiries for foundry coke

are reported, and there is a little business in bakers' coke. Domestic grades are still very dull.

Finished Iron and Steel.—Fabricators are looking forward to the issuance of plans soon for the proposed new office building for the Southwestern Bell Telephone Co., which has been approved by the Board of Public Service. Approximately 7000 tons of structural steel will be required. The principal contract pending is the Mayfair Hotel, involving about 400 tons of reinforcing bars. Business in other lines is dull.

For stock out of warehouse we quote: Soft steel bars, 3.35c. per lb.; iron bars, 3.35c.; structural shapes, 3.45c.; tank plates, 3.45c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, cold-rolled, one pass, 5c.; cold rolled rounds, shafting and screw stock, 4.15c.; structural rivets, 3.90c.; boiler rivets, 4.10c.; tank rivets, $\frac{1}{2}$ -in. and smaller, 60 per cent off list; machine bolts, 55 and 5 per cent; carriage bolts, 40-5 per cent; lag screws, 60 and 5 per cent; hot pressed nuts, squares or hexagons, blank or tapped, \$3.50 off list.

Old Material.—Consumers of old material in the St. Louis industrial district are buying hardly anything, and yet the market is unchanged. Prices are being maintained as a result of competition among dealers, who continue optimistic despite slim order files. New railroad lists include: Missouri-Kansas-Texas, 1000 tons; Great Northern, 2500 tons; Norfolk & Western, 11,000 tons; Wabash, 3100 tons, and Rock Island, 3000 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton
Iron rails \$12.00 to \$12.50
Rails for rolling 14.00 to 14.50
Steel rails less than 3 ft. 15.00 to 15.50
Relaying rails, 60 lb. and under 25.00 to 26.00
Relaying rails, 70 lb. and over 32.50 to 33.50
Cast iron car wheels 14.00 to 14.50
Heavy melting steel 13.00 to 13.50
Heavy shoveling steel 13.00 to 13.50
Frogs, switches and guards cut apart 13.50 to 14.00
Railroad springs 15.75 to 16.25
Heavy axles and tire turnings 10.00 to 10.50
No. 1 locomotive tires 14.50 to 15.00
Per Net Ton
Steel angle bars 12.50 to 13.00
Steel car axles 15.00 to 15.50
Iron car axles 21.00 to 21.50
Wrought iron bars and transoms 15.50 to 16.00
No. 1 railroad wrought 10.25 to 10.75
No. 2 railroad wrought 11.00 to 11.50
Cast iron borings 8.50 to 9.00
No. 1 busheling 11.50 to 12.00
No. 1 railroad cast 16.00 to 16.50
No. 1 machinery cast 17.50 to 18.00
Railroad malleable 12.00 to 12.50
Machine shop turnings 5.50 to 6.00
Champion bundled sheets 7.50 to 8.00

Detroit Scrap Market

DETROIT, June 17.—Some buying of pig iron for third quarter delivery has developed and inquiry on blast furnace scrap by several blast furnace interests has strengthened the price on these materials. The actual melt in the district has not improved and automobile manufacturers are working on their stocks of castings.

The following prices are quoted on a gross ton basis f.o.b. cars producers' yards, excepting stove plate, No. 1 machinery cast and automobile cast, which are quoted on a net ton basis:

Heavy melting steel	\$12.50 to \$13.50
Shoveling steel	12.50 to 13.50
Borings	10.50 to 11.00
Short turnings	10.50 to 11.00
Long turnings	8.50 to 9.00
No. 1 machinery cast	15.00 to 16.00
Automobile cast	19.00 to 20.00
Hydraulic compressed	10.00 to 11.00
Stove plate	13.50 to 14.50
No. 1 busheling	10.00 to 11.00
Sheet clippings	8.00 to 8.75
Flashings	9.00 to 9.75

The Franklin Institute, Philadelphia, was incorporated by the State of Pennsylvania on March 30, 1824, "for the promotion of the mechanic arts." It has been decided to celebrate the centenary of the signing of the act of incorporation, and the days set apart are Sept. 17, 18 and 19. Invitations for the commemoration have been issued by the president and secretary of the institute.

Philadelphia

Moderate Activity in Plates and Pig Iron—Operations at 40 to 50 Per Cent

PHILADELPHIA, June 17.—Moderate activity in plates and pig iron prevails in the eastern Pennsylvania market. Lots moving in these lines are only small, while in other products the market shows no improvement. No indication of any marked upturn is evident, but the fact that stocks in the hands of consumers are either small or practically bare gives promise of a stimulated buying movement when it does set in. Prices are unchanged but show a weak undertone, and there have been some sales of foundry iron at slightly less than the current quotations, but these have been for tonnages which in the present situation are above the average. Furnaces, however, continue to hold to prices prevailing last week on the general run of business.

Orders placed for plates in this district the past week when accumulated represent a fair lot. The principal quotation is 2c., base, Pittsburgh, although some producers name as high as 2.10c. Actually, it is understood that on large tonnages as low as 1.90c. is obtainable. The market for plain material continues to drag, and the quotation remains at 2.10c., base, Pittsburgh. Steel bars are in small demand and are quoted as 2.20c., base, Pittsburgh. Mill operations in this district range from 40 to 50 per cent of capacity.

Pig Iron.—Sales of pig iron the past week aggregated about the same total as the week preceding, when a fair volume of tonnage was moved. Most of it consists of foundry grades and chiefly involved small lots. A radiator company in Trenton, N. J., closed with a furnace in this district for 2000 tons of foundry iron. While the specific price was not stated it is understood to have been at approximately the current quotation, which worked back to about \$20, furnace. Small lots of basic and copper bearing iron have been sold and while the prices of basic have been \$21, delivered, on most of the tonnage, it is said that a light tonnage went at the equivalent of \$20.75, but this is not considered representative of the market as yet. Copper bearing low phosphorus iron sales have been made at the regular range of \$24 to \$25, furnace. Imports of pig iron to the Philadelphia district the past week amounted to 5368 tons, of which 4054 tons came from the Netherlands and 1314 tons came from Calcutta, India.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76c. to \$1.63 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.76 to \$22.13
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.26 to 22.63
East. Pa. No. 1X sil.	21.76 to 23.13
Virginia No. 2 plain, 1.75 to 2.25 sil.	30.17 to 31.17
Virginia No. 2X, 2.25 to 2.75 sil.	30.67 to 31.67
Basic delivered eastern Pa.	21.00 to 21.50
Gray forge	22.00 to 22.50
Malleable	22.50 to 23.50
Standard low phos. (f.o.b. furnace)	24.00 to 25.00
Cooper bearing low phos. (f.o.b. furnace)	24.00 to 25.00

Ore.—Receipts of iron ore the past week amounted to 13,931 tons, of which 7931 tons came from Sweden and 6000 tons came from Tunis, French Africa. Manganese ore receipts were 7834 tons, of which 7334 tons were from Constantinople and 500 tons from Calcutta, India. Receipts of chrome ore amounted to 7000 tons, which came from Portuguese Africa.

Ferroalloys.—The market for ferroalloys is listless. Prices are unchanged with standard ferromanganese quoted at \$107.50, furnace or seaboard, for both domestic and foreign material.

Sheets.—Small lots of sheets are being sold, but the market is quiet. Blue annealed No. 10 gage is quoted at 2.80c., Pittsburgh; black No. 28 at 3.65c., and galvanized No. 28 at 4.80c.

Billets.—Demand for billets is dull, but light transactions are being made with rerolling billets quoted at \$38 and forging billets at \$43, base, Pittsburgh.

Plates.—Numerous small orders for plates were

placed in this district the past week. They came principally from tank and boiler makers. Producers say that the orders together with inquiries give a more encouraging tone to the market, but they do not suggest that the improvement will be permanent or is only temporary. On large tonnages a price of 2c., base, Pittsburgh, has been done, and it is said that an attractive inquiry might develop as low a figure as 1.90c. The prevailing quotation among some of the larger producers is 2.10c.

Structural Material.—Demand coming to fabricators is exceptionally light and involves only small and miscellaneous lots. No real test of the market has been made recently and it is still quoted at 2.10c., base, Pittsburgh, with reports that a light tonnage of plain material has moved at 2c. Imports the past week included 83 tons from France and 51 tons from Belgium.

Bars.—No improvement has developed in the market for iron and steel bars. Few small transactions for steel bars have been made while the market for iron bars is extremely dull. Steel bars are quoted at 2.20c., base, and iron bars at 2.10c., base, both Pittsburgh.

Warehouse Business.—Easier prices in steel from the mills have been reflected in reductions in several lines of warehouse products, including plates, shapes, bars, bands and rails, ranging from 12c. to 17c. per 100 lb. Fair demand has come to warehouse for fabricated and plain material. Stocks are low.

Soft steel bars and small shapes, 3.35c.; iron bars (except bands), 3.35c.; round edge iron, 3.50c.; round edge steel, iron finished, 1½ x ½ in., 3.50c.; round edge steel planished, 4.30c.; tank steel plates, ¼ in. and heavier, 3.35c.; tank steel plates, ½ in., 3.60c.; blue annealed steel sheets, No. 10 gage, 3.90c.; black sheets, No. 28 gage, 4.95c.; galvanized sheets, No. 28 gage, 6c.; square twisted and deformed steel bars, 3.35c.; structural shapes, 3.45c.; diamond pattern plates, ¼-in., 5.30c.; ¾-in., 5.50c.; spring steel, 5c.; round cold-rolled steel, 4.35c.; squares and hexagons, cold-rolled steel, 4.85c.; steel hoops, 1 in. and wider, No. 20 gage and heavier, 4.10c.; narrower than 1 in., all gages, 4.60c.; steel bands, No. 12 gage to ¾-in., inclusive, 4.10c.; rails, 3.35c.; tool steel, 8.50c.; Norway iron, 7c.

Old Material.—Because of the low prices, scrap dealers are indisposed to sell to mills whose inquiries are light. Sales consequently have been small. Brokers and dealers are more inclined to pay higher prices than mills are, in order to maintain stocks to meet demand when it does come. Sales of heavy melting steel have been made at \$16, but tonnage still is available at \$15 to \$15.50. Cast borings business for steel works and rolling mills has been done at \$13.50 and this grade now takes a range of \$13 to \$13.50.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	\$15.00 to \$15.50
Scrap rails.....	15.00 to 15.50
Steel rails for rolling.....	17.00 to 17.50
No. 1 low phos., heavy 0.04 and under.....	19.00 to 20.00
Couplers and knuckles.....	18.50 to 19.00
Cast-iron car wheels.....	17.00 to 17.50
Rolled steel wheels.....	18.50 to 19.00
No. 1 railroad wrought.....	16.50 to 17.00
No. 1 yard wrought.....	16.00 to 16.50
No. 1 forge fire.....	13.00 to 13.50
Bundled sheets (for steel works).....	12.50 to 13.00
Mixed borings and turnings (for blast furnace use).....	11.00 to 11.50
Machine shop turnings (for steel works use).....	12.00 to 12.50
Machine shop turnings (for rolling mill use).....	12.00 to 12.50
Heavy axle turnings (or equivalent).....	14.00 to 14.50
Cast borings (for steel works and rolling mills).....	13.00 to 13.50
Cast borings (for chemical plants).....	14.00 to 14.50
No. 1 cast.....	17.50 to 18.00
Heavy breakable cast (for steel plants).....	16.00
Railroad grate bars.....	14.00 to 14.50
Stove plate (for steel plant use).....	14.00 to 14.50
Wrought iron and soft steel pipes and tubes (new specifications).....	15.00
Shafting.....	22.00 to 22.50
Steel axles.....	20.00 to 21.00

Approximately 3000 operatives were laid off temporarily on June 14 in the West Milwaukee locomotive and car construction and repair shops of the Chicago, Milwaukee & St. Paul Railway Co., at Milwaukee. A decided cut in income and a slack condition generally was declared responsible. According to W. J. Thiele, general superintendent, it is likely that the men will be recalled July 1 or 7.

Cincinnati

Lake Furnaces Take Pig Iron Business and Prices Are Lower

CINCINNATI, June 17.—Several round tonnage lots of pig iron were sold in this territory during the past week. A large melter, with plants throughout the country, took 3000 tons for third quarter delivery from an Ironton district furnace at \$20, base. A southern Indiana melter bought 1500 tons from a Lake front furnace at \$19, base, furnace, while a northern Indiana melter closed for 1500 tons of malleable at \$19, Lake furnace. A central Ohio melter is reported to have placed 300 tons of malleable with a northern Ohio steel works interest at \$18.50, furnace, or on the basis of \$19, Ironton. A sale of several hundred tons of Southern iron was reported at slightly less than \$19, Birmingham basis, and it is said that open quotations of \$19 are now being made by two interests. Actual inquiry is light, though sellers report melters are showing more interest as prices recede. Stocks on foundry yards are low, and though the melt is dropping off, buying for current needs is expected to be better than it has been for several months.

Based on freight rates of \$4.05 from Birmingham and \$2.27 from Ironton we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$23.05 to \$24.05
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	23.55 to 24.55
Ohio silvery, 8 per cent.	32.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	22.27 to 23.27
Basic Northern	22.27
Malleable	22.27 to 23.27

Fluorspar.—Sales are light and prices unchanged at the range printed on page 1827. Inquiries generally run to carload lots, with the smaller producers taking most of the business offering.

Coke.—The coke market is inactive, and sales and shipments are light. Prices continue to decline. Production is steadily being cut, and in most districts averages less than 40 per cent of capacity. Connellsville furnace is quoted at \$3.15 per net ton at oven, and foundry at \$4.50. Wise County furnace is available at \$3.75 and foundry at \$4.50. No change in New River or by-product fuels is reported.

Connellsville furnace, \$3.15; foundry, \$4.50; New River foundry, \$9 to \$10; Wise County furnace, \$3.75; foundry, \$4.50; by-product foundry, \$7.50; Connellsville basis.

Sheets.—The week was a very quiet one, and orders were confined to carload lots and less, with prices showing little change from the previous week. On blue annealed sheets, 2.75c. is quoted, on black 3.60c. and on galvanized 4.75c., though most of the larger companies are quoting \$1 per ton above these prices. Automobile body sheets are steady at 5.10c.

Reinforcing Bars.—The Waverly Hospital, Louisville, requiring 500 tons, is up for bids. A warehouse building for the General Electric Co., Cincinnati, will require 300 tons, and bids will shortly be taken on the Brown office building, Louisville, involving approximately 800 tons. Several large inquiries are still pending, and awards are expected this week. These include rapid transit work, Cincinnati, 1000 tons; bridge work at Indianapolis, Ind., 1000 tons, and foundry building for Standard Sanitary Mfg. Co., Louisville, Ky., 350 tons. Prices are about the same as last week, the range being from 2c. to 2.20c., mill, for both rail steel and new billet stock.

Finished Material.—Plates and shapes are in slightly improved demand, an inquiry for 2000 tons of plates for gas holder work appearing. Prices are still inclined to sag, particularly on plates, and it is rumored that on an order for 500 tons placed this week, a price equivalent to 2.05c., Pittsburgh, took the order. The general quotation on plates is now 2.15c., Pittsburgh, on shapes, 2.20c., and on bars, 2.20c. to 2.25c. There was a slightly improved demand for wire products, particularly barbed wire, which had not been in demand heretofore. More activity is noted in fabricated steel, although new in-

quiries generally are for small tonnages. Wire nails also showed a little more activity, at prices unchanged from last week. Reports of 70 and 10 being quoted on machine bolts are frequently heard, and it is not improbable that 70, 10 and 5 has been done. The demand is light. A local sales agency reports orders for a small tonnage of standard rails, scattered over the district. Track supplies are in poor demand, and light rails are inactive and weak, the nominal quotation on the latter being 1.90c., with a possibility of this price being considerably shaded on attractive tonnages.

Warehouse Business.—Local jobbers report business to date this month considerably better than for the similar period of any month so far this year. This is made up of a larger number of orders for small tonnages, and includes practically all products. A reduction of \$1 per ton has been made by sheet jobbers, and wire jobbers have reduced prices on common wire nails 5c. per keg.

Cincinnati jobbers quote: Iron and steel bars, 3.50c.; reinforcing bars, 3.60c.; hoops, 4.55c.; bands, 4.25c.; shapes, 3.60c.; plates, 3.60c.; cold-rolled rounds, 4.25c.; cold-rolled flats, squares and hexagons, 4.75c.; open-hearth spring steel, 5c. to 6c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, 4.75c.; No. 28 galvanized sheets, 5.85c.; No. 9 annealed wire, 3.60c.; common wire nails, \$3.35 per keg base; cement coated nails, \$3 per keg.

Old Material.—A better feeling is evident in the scrap market, and prices are on the up-turn, an average advance of 50c. per ton being made during the week. Some consumers are feeling out the market, and a moderate buying movement for third quarter is expected. Current activity is confined to carload lots.

We quote dealers' buying prices, f.o.b. cars, Cincinnati:

<i>Per Gross Ton</i>	
Heavy melting steel	\$11.50 to \$12.00
Scrap rails for melting	11.00 to 11.50
Short rails	16.00 to 16.50
Relaying rails	27.50 to 28.00
Rails for rolling	13.00 to 13.50
Old car wheels	12.00 to 12.50
No. 1 locomotive tires	13.00 to 13.50
Railroad malleable	14.00 to 14.50
Agricultural malleable	13.00 to 13.50
Loose sheet clippings	7.50 to 8.00
Champion bundled sheets	9.50 to 10.00

<i>Per Net Ton</i>	
Cast iron borings	8.00 to 8.50
Machine shop turnings	7.00 to 7.50
No. 1 machinery cast	17.00 to 17.50
No. 1 railroad cast	13.50 to 14.00
Iron axles	20.00 to 20.50
No. 1 railroad wrought	9.50 to 10.00
Pipes and flues	6.50 to 7.00
No. 1 busheling	8.00 to 8.50
Mixed busheling	5.50 to 6.00
Burnt cast	9.50 to 10.00
Stove plate	9.50 to 10.00
Brake shoes	10.50 to 11.00

Cleveland

Little Betterment in Finished Steel, But Pig Iron Fairly Active

CLEVELAND, June 17.—Some of the mills report a slight improvement in business which appears to be due to the low condition of stocks that necessitated replacement orders. While there is virtually no demand from the automotive industry, Detroit reports that some of the automobile plants have released orders for parts and that the car builders are looking for an improvement in their operations in July. Industrial plants in this territory have further reduced operations and according to present estimates metal working shops in this city are now operating at little if any above 50 per cent of capacity. New demand in the building field is very light and little new work involving round lots of steel is coming out in other fields. The New York Central Railroad has asked for estimates on 15 Pacific type locomotives, 25 switch engines and 40 tanks requiring 2100 tons of steel. Bids will be taken this week on the recent inquiry for 1000 tons of sheet steel piling for the Union Station, Cleveland. Prices generally are holding to recent levels. Steel bars and structural material are firm at 2.20c. Plates still range from 2.10c. to 2.20c., with a 2.15c. price fairly common

except for round lots. Hot rolled strip steel is weak with quotations ranging from 2.50c. to 2.60c. and hoops and bands are irregular with 2.75c. as the maximum quotation. Cold rolled steel mills are shading the regular price, this material being quoted at 4.35c. to 4.50c.

Jobbers quote steel bars, 3.36c.; plates and structural shapes, 3.46c.; No. 28 black sheets, 4.55c. to 4.65c.; No. 28 galvanized sheets, 5.65c.; No. 10 blue annealed sheets, 3.65c.; cold rolled rounds, 3.90c.; flats, squares and hexagons, 4.40c.; hoops and bands, 1 in. and wider and 20 gauge or heavier, 4.16c.; narrower than 1 in. or lighter than No. 20 gauge, 4.66c.; No. 9 annealed wire, \$3.30 per 100 lb.; No. 9 galvanized wire, \$3.75 per 100 lb.; common wire nails, \$3.40 base per 100 lb.

Pig Iron.—The market continues fairly active. The recent buying by some of the large consumers appears to have stimulated the market, as some foundries evidently think that prices are now near the bottom and these are covering for their expected minimum requirements for the third quarter. A Cleveland interest during the week placed about 10,000 tons including 5000 tons of basic iron for Sharon, 2000 tons of basic for a Chicago district plant and 3000 tons of malleable-iron for various plants. The basic for Sharon delivery was purchased from a broker at about \$19, Valley. The Westinghouse Electric & Mfg. Co. has purchased an additional lot of 2000 tons of foundry iron for its Cleveland plant. This went to a Cleveland furnace at \$20.50, or at the same price at which Westinghouse bought 3100 tons from another Cleveland producer in the previous week. Outside of these sales there is very little demand in the northern Ohio territory. The activity appears to be centered largely in Indiana, where several sales were made during the week and whence comes a number of inquiries aggregating 10,000 tons or more, pending. A Richmond, Ind., melter bought 1500 tons of foundry iron. Indiana inquiries include one from Muncie for 1500 tons of malleable iron and one from Anderson for 2000 tons of foundry iron. One producer reports sales during the week aggregating 10,000 tons. Some of the Michigan stove companies are buying foundry iron but no business is coming from the automobile industry which will carry considerable second quarter iron over into the third quarter. Lake furnace prices are lower, apparently having settled down to the common range of \$19.50 to \$20 for outside shipment, but for competitive points \$19 probably would be quoted. While \$20 is still being quoted in the Valley district, this price is no longer bringing orders and \$19.50 appears to be the maximum price at which sales are being made in that district.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a \$3.02 freight rate from Jackson and \$6 rate from Birmingham:

Basic, Valley furnace.	\$20.00
N'th'n No. 2 fdy., sil. 1.75 to 2.25...	\$21.00 to 21.50
Southern fdy., sil. 1.75 to 2.25...	27.00
Malleable.....	21.00 to 21.50
Ohio silvery, 8 per cent.....	33.52
Stand. low phos., Valley furn....	27.00 to 27.50

Coke.—Sales of foundry coke are very light with prices unchanged at \$4.75 to \$6 for the better grades of Connellsville coke. Some grades are being offered down to \$4.25.

Iron Ore.—Shipments have fallen off and with vessel capacity in excess of demand, quite a number of boats that were placed in commission at the opening of the season of navigation have been laid up. The market is inactive.

Alloy Steel.—Production by Ohio mills has been reduced about 50 per cent and the only new demand is for small lots. The market lacks strength and an inquiry of any size would probably bring concessions of 1/4c. a pound on most grades.

Bolts, Nuts and Rivets.—Prices continue irregular, although some manufacturers are refusing to shade regular quotations on the small lot business that is coming out. Production of bolts and rivets in this territory is down to about 50 per cent of capacity.

Sheets.—Prices are holding fairly firm at 3.60c. to 3.65c. for black sheets, 2.75c. to 2.80c. for blue annealed and 4.80c. for galvanized sheets. Orders are still ex-

ceedingly light and confined to small lots. On tin mill black plate a quotation of 3.65c. is being made by independent mills or \$2 a ton lower than recently. Ohio sheet mills are operating at less than 50 per cent of capacity.

Reinforcing Bars.—The demand for small lots continues fair. Inquiry includes 250 tons for the Ohio Bell Telephone Building in Canton. Prices lack firmness with billet steel bars quoted as low as 2.15c., Pittsburgh, and quotations by some local jobbers at 2.70c. to 2.80c. On rail steel bars 2c. is now the maximum price, with quotations appearing down to 1.80c.

Semi-Finished Steel.—Although specifications are light the leading local producer continues to operate at 50 per cent of capacity. There is no new demand. Prices are unchanged at \$40 for sheet bars and \$38 for billets and slabs.

Warehouse Business.—The volume of business is only moderate, sales having fallen off slightly during this month. Price irregularities continue with concessions of \$2 a ton.

Old Material.—The market has become firmer and prices have advanced on a few grades. There is no demand from consumers but dealers are still buying some blast furnace scrap to fill recent contracts and prices on borings and turnings have advanced 25c. a ton. Sales of these grades are reported from \$13 to \$13.25, delivered to Cleveland furnaces. Busheling has advanced \$1 a ton, because some demand has developed for this grade recently for blast furnace iron. The only activity in steel making grades is the purchase of material by dealers to lay down. This speculative buying and the large reduction in production are the present supports of the market.

We quote dealers' prices f.o.b. Cleveland per gross ton:

Heavy melting steel.....	\$14.00 to \$14.25
Rails for rolling.....	15.50 to 16.00
Rails under 3 ft.....	16.25 to 16.75
Low phosphorus melting.....	16.50 to 16.75
Cast iron borings.....	12.75 to 13.00
Machine shop turnings.....	11.75 to 12.00
Mixed borings and short turnings.....	12.75 to 13.00
Compressed sheet steel.....	12.00 to 12.25
Railroad wrought.....	12.00 to 12.25
Railroad malleable.....	17.50 to 18.00
Light bundled sheet stampings.....	11.50 to 12.00
Steel axle turnings.....	12.75 to 13.25
No. 1 cast.....	20.00 to 20.50
No. 1 busheling.....	12.25 to 12.75
Drop forge flashings.....	10.00 to 10.25
Railroad grate bars.....	13.50 to 13.75
Stove plate.....	13.25 to 13.50
Pipes and flues.....	10.00 to 10.25

Betterment Noted at Youngstown

YOUNGSTOWN, June 17.—District iron and steel interests report betterment in inquiry and buying this week in both pig iron and rolled steel products. Car-load lot orders have been received for sheets, pipe, plates and bars. Heavier pig iron buying presages further improvement in the demand for finished steel, makers predict. Some interests look for business at an early date in volume to warrant 50 per cent production.

Important consuming interests have placed orders for pig iron, for deliveries over the third and into the fourth quarter.

The structural iron workers in Chicago at a recent meeting unanimously voted against a strike to enforce their demands for an increase in wages from \$1.25 to \$1.50 an hour. Talk of a strike has been encouraged by increases recently granted to other trades, but it is said that the proposed action was voted down on the grounds that it would have been a direct violation of the agreement under which the iron workers are employed.

The new modified type of blast furnace erected under the direction of C. H. Gilmour, at Cave Spring, Ga., under patents issued a few months ago, will be put to the test between July 10 and 15, according to Y. A. Dyer, president Southern Metallurgical Co., Inc.

LARGE FOREIGN INTERESTS BUY

Argentina Inquiries for Oil Well Casing and Japan for Tin Plate, Rails and Boiler Tubes

NEW YORK, June 17.—Merchant trade with Japan and China continues extremely light, but activity on the part of railroads and large corporations somewhat offsets this dullness in Far Eastern business and gives the impression of a fairly active demand. As there is but little purchasing either by railroads or corporations in China, trade from this market actually is very dull. Even wire shorts, which are almost always acceptable to Chinese buyers at their own price, seldom induce a counter offer at a lower price.

From Japanese sources, occasional orders for 50 tons or 75 tons of light gage black sheets about represent the sheet market. While the leading export interest is evidently holding its quotation to within a few dollars of \$100 per ton, c.i.f. Japan, on 27 sheets to the bundle, business is said to be possible with some independent mills at considerably less.

Japanese railroads seem to be more active at present than any other source of demand. A recent inquiry for special rails calls for 320 pieces of 32-ft. sections. The South Manchuria Railway Co., Dairen, Manchuria, which has been an active purchaser of equipment lately, is receiving bids on 4000 boiler tubes. This railroad was recently in the market for 2000 tons of chilled iron car wheels and is reported to have awarded 1000 tons

to Mitsui & Co., New York, and another 1000 tons to another export house, which placed them with a Chicago car wheel maker. The former tonnage is said to have been awarded to a New York wheel maker. A railroad tender now in the market is from the Imperial Government Railways, which has just opened bids on 360 tons of channels for bridge work. The sheet steel piling totaling 420 tons was awarded to Mitsui & Co. and Lackawanna sheet piling was furnished.

A recent tender for sheet steel piling is from the municipality of Osaka and calls for 192 pieces, about 40 tons. An inquiry is said to be in preparation by a Japanese city for 12 miles of 91-lb. grooved rails. Bids are being submitted on one mile of 60-lb. rails, A. S. C. E. specifications, for the Han Shin Railway, which operates between Osaka and Kobe. Quotations have been requested by the Kioto Oil Co. on 10,000 boxes of 14 x 18 $\frac{1}{2}$ in. and 3400 boxes of 10 x 20 in. tin plate, a total of 13,400 boxes.

Of the order for 1200 cars placed by a representative of the South Australian Railways with the American Car & Foundry Co., a few minor details are still being arranged, such as settlement of car wheels, etc. The Argentine oil fields, Comodoro Rivadavia, are again in the market for equipment, this time for a total of 20,000 tons of oil-well casing. Specifications are in metric measurements and according to American makers are evidently based on German Mannesmann measurements, so that it is highly probable the business will go to Europe.

Flow of Blast Furnace Gas in Large Mains

(Concluded from page 1811)

line, were obtained by measurement. The values of h , the pitot tube reading, and h' the pressure drop, were read by differential indicating gages reading to 0.001 in. of water.

The values found for C and some general auxiliary data showing the conditions under which C was determined are given in the table below:

K = Cross section factor.....	0.915	0.915
L = Length in feet.....	130.50	92.40
d = Inside diameter, inches.....	65.25	65.25
Velocity of gas, ft. per sec.....	42 to 45	45 to 65
Weight of gas, lb. per cu. ft.....	0.05268	0.04454
Specific gravity of gas.....	0.692	0.585
Temperature of gas, deg. Fahr.....	282	423
Pitot tube reading,		
Average $\sqrt{\frac{h''}{h}}$ = in. of water	1.693	2.000
	Static pressure drop, in. of water	
C =	2.437	2.421

There will be noted the very close agreement in the values of C taken at the different lengths. Each of these values is the average of 20 determinations, none of which varied more than 2½ per cent from the average. The value of C for such applications was taken at the even number of 2430.

The Interstate Commerce Commission has approved an order whereby the Louisville & Nashville and the Atlantic Coast Line railroads will lease the Carolina, Clinchfield & Ohio Railroad and its subsidiaries for a period of 999 years. The lessees contemplate the linking up of the system by an extension of the present McRoberts branch of the L. & N.

Stockholders of the International Harvester Co. have ratified proposals authorizing the sale to employees of \$15,000,000 preferred stock to be issued at the discretion of the board at not less than par. This is a step in plans being formulated to provide for profit-sharing by the employees.

Five water wheels for the United States for locks on the Ohio river will be built by the Hoppers Water Wheel Co., Springfield, Ohio.

German Iron and Steel Dull

(Concluded from page 1810)

the keen competition and the cutting of prices, the Associations of Drill Manufacturers and of Manufacturers of Precision Tools have abolished the price convention for the home market. Export business is lively, especially to South America, Holland and Scandinavia. Some leading firms are endeavoring to secure orders from Japan, which has a large demand. France and Belgium are in the market with cheap quotations for some tools.

Mining Strikes Cause Shortage of Fuel and Closing of Works

Negotiations for a settlement of the strikes and lockouts in the coal industry of Saxony have proved abortive and the struggle continues. The award which had been given in the Ruhr coal industry on May 27, and which was rejected by both employers and men, now has been declared binding. It seems that work will be started during the course of the week. Owing to scarcity of fuel the Phoenix Ironworks in Ruhrtort, the Rheinstahlwerke in Meiderich, and the Bochumer Verein are closing the greatest part of their works. At the Rheinstahlwerke the open-hearth works and three blast furnaces and a few small departments are kept going at 60 per cent of their normal capacity. The Krupp iron works or Friedrich-Alfred-Hütte at Rheinhausen gave notice of entire closing. Only a few departments working for export are to continue production.

The Austrian Daimler Co. has completed fusion with the Austrian Aeroplane Works, whose shares it has held for some years. A new syndicate has been established in the Czechian engineering industry for the express purpose of organizing the export trade in machinery, especially in agricultural machines and implements to the Balkans, the Near East and Hungary.

"Combustibility of Coke and Rate of Combustion" is the title of a report of the Bureau of Mines, Serial No. 2604, by T. L. Joseph, associate metallurgist, North Central Experiment Station of the Bureau, Minneapolis, Minn.

Prices Finished Iron and Steel f.o.b. Pittsburgh

Carload Lots

Plates

Sheared, tank quality, base, per lb..... 2.15c. to 2.20c.

Structural Materials

Beams, channels, etc., base, per lb..... 2.20c. to 2.25c.
Sheet piling 2.30c. to 2.40c.

Iron and Steel Bars

Soft steel bars, base, per lb..... 2.20c. to 2.25c.
Soft steel bars for cold finishing..... \$3 per ton over base
Reinforcing steel bars, base..... 2.20c. to 2.25c.
Refined iron bars, base, per lb..... 3c.
Double refined iron bars, base, per lb..... 4.75c.
Stay bolt iron bars, base, per lb..... 6.50c. to 7.00c.

Hot-Rolled Flats

Hoops, base, per lb..... 2.75c.
Bands, base, per lb..... 2.75c.
Strips, base, per lb..... 2.50c. to 2.75c.

Cold-Finished Steel

Bars and shafting, drawn or rolled, base, per lb..... 2.90c.
Bars and shafting, drawn or rolled, l.c.l., per lb 2.90c. to 3.00c.
Shafting, turned and polished, base, per lb..... 3.00c. to 3.10c.
Bars, S. A. E. Series, No. 2100..... 4.75c.
Bars, S. A. E. Series, No. 2300..... 6.25c.
Bars, S. A. E. Series, No. 3100..... 5.25c.
Strips, base, per lb..... 4.50c.

Wire Products

(To jobbers in car lots)

Nails, base, per keg..... \$2.90
Galvanized nails, 1 in. and over..... \$2.25 over base
Galvanized nails, less than 1 in..... 2.50 over base
Bright plain wire, base, No. 9 gage, per 100 lb..... \$2.65
Annealed fence wire, base, per 100 lb..... 2.80
Spring wire, base, per 100 lb..... 3.70
Galvanized wire No. 9, base, per 100 lb..... 3.25
Galvanized barbed, base, per 100 lb..... 3.70
Galvanized staples, base, per keg..... 3.70
Painted barbed wire, base, per 100 lb..... 3.35
Polished staples, base, per keg..... 3.35
Cement coated nails, base, per count keg..... 2.35
Bale ties, carloads to jobbers..... 75.5, 5 and 2½ to 75 and 5 per cent off list
Woven fence, carloads (to jobbers)..... 67½ per cent off list
Woven fence, carloads (to retailers)..... 65 per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads, 60, 20 and 10 per cent off list
Machine bolts, all sizes, cut threads, 60 and 20 per cent off list
Carriage bolts, ¾ x 6 in.:
Smaller and shorter, rolled threads, 60 and 20 per cent off list
Carriage bolts, cut threads, all sizes, 60 and 20 per cent off list
Lag bolts 65 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads, 50 and 10 per cent off list
Other style heads 20 per cent extra
Machine bolts, c.p.c. and t. nuts, ¾ x 4 in., 50, 10 and 10 per cent off list
Larger and longer sizes, 50, 10 and 10 per cent off list
Hot pressed squares or hex. nuts, blank 5c. off list
Hot pressed nuts, tapped 5c. off list
C.p.c. and t. square or hex. nuts, blank 4.50c.
C.p.c. and t. square or hex. nuts, tapped 4.50c.
Semi-finished hex. nuts:
¾ in. and smaller, U. S. S. 80, 10 and 5 per cent off list
½ in. and larger, U. S. S. 75, 10 and 5 per cent off list
Small sizes, S. A. E. 80, 10, 10 and 5 per cent off list
S. A. E., ¾ in. and larger 75, 10 and 5 per cent off list
Stove bolts in packages 80, 10 and 5 per cent off list
Stove bolts in bulk 80, 10, 5 and 2½ per cent off list
Tire bolts 60 and 10 per cent off list
Bolt ends with hot pressed nuts 60 and 5 per cent off list
Bolt ends with cold pressed nuts 50 and 5 per cent off list
Turnbuckles, with ends, ½ in. and smaller, 55 and 5 per cent off list
Turnbuckles, without ends, ½ in. and smaller, 70 and 10 per cent off list
Washers 5.75c. to 6.00c.
Lock washers 80 per cent off list

Semi-Finished Castellated and Slotted Nuts

(To jobbers and consumers in large quantities f.o.b. Pittsburgh.)

	Per 1000		Per 1000	
S. A. E.	U. S. S.		S. A. E.	U. S. S.
1½-in.	\$4.25		1½-in.	\$13.25
2½-in.	4.90		2½-in.	16.25
3½-in.	5.90		3½-in.	22.50
4½-in.	7.50		4½-in.	34.00
5½-in.	9.75		5½-in.	53.00
	10.00		1-in.	55.00

Larger sizes—Prices on application.

Cap and Set Screws

Milled hex. head cap screws, 75, 10 and 5 per cent off list
Milled standard set screws, case hardened, 75, 10 and 5 per cent off list
Milled headless set screws, cut thread, 75, 10 and 5 per cent off list
Upset hex. head cap screws, U. S. S. thread, 80, 10 and 10 per cent off list
Upset hex. head cap screws, S. A. E. thread, 80, 10 and 10 per cent off list
Milled studs 65 and 10 per cent off list

Rivets

Large structural and ship rivets, base, per 100 lb. \$2.60 to \$2.75
Small rivets 70 and 10 per cent off list

Track Equipment

Spikes, ½ in. and larger, base, per 100 lb.	\$2.90 to \$3.00
Spikes, ½ in. and smaller, base, per 100 lb.	3.25 to 3.40
Spikes, boat and barge, base, per 100 lb.	3.25 to 3.40
Track bolts, all sizes, base, per 100 lb.	3.75 to 4.25
Tie plates, per 100 lb.	2.50 to 2.55
Angle bars, base, per 100 lb.	2.75

Welded Pipe

Butt Weld		Iron	
Inches	Steel	Black	Galv.
1½	45	19 ½	1½ to 2½
2 to 3	51	25 ½	+11
3½	56	42 ½	22
4½	60	48 ½	11
5 to 6	62	50 ½	13

Lap Weld

Lap Weld		Weld	
Inches	Steel	Black	Galv.
2	55	43 ½	2
2½ to 6	59	47 ½	2½
7 and 8	56	43 ½	6
9 and 10	54	41 ½	28
11 and 12	53	40 ½	11

Butt Weld, extra strong, plain ends

Butt Weld, extra strong, plain ends		Weld	
Inches	Steel	Black	Galv.
1½	41	24 ½	2 to 3
2 to 3	47	30 ½	1½ to 2½
3½	53	42 ½	21
4½	58	47 ½	28
5 to 6	60	49 ½	12

Lap Weld, extra strong, plain ends

Lap Weld, extra strong, plain ends		Weld	
Inches	Steel	Black	Galv.
2	53	42	2
2½ to 4	57	46 ½	2½ to 4
4½ to 6	56	45 ½	6
7 to 8	52	39 ½	7 to 8
9 and 10	45	32 ½	9 to 12
11 and 12	44	31 ½	16

To the large jobbing trade the above discounts are increased by one point, with supplementary discount of 5 per cent on black and 1½ points, with a supplementary discount of 5 per cent on galvanized.

Boiler Tubes

Lap Welded Steel		Charcoal Iron
Inches	Steel	Charcoal Iron
2 to 2½ in.	27	1½ in. +18
2½ to 3 in.	37	2½ to 3 in. +8
3 in.	40	2 to 2½ in. —2
3½ to 3¾ in.	42 ½	2½ to 3 in. —7
4 to 13 in.	46	3 ¼ to 4 ½ in. —9

Standard Commercial Seamless Boiler Tubes

Cold Drawn		Hot Drawn
Inches	Steel	Hot Drawn
1 in.	55	3 and 3 ¼ in. 36
1½ and 1½ in.	47	3 ½ and 3 ¾ in. 37
1¾ in.	31	4 in. 41
2 and 2½ in.	22	4 ½ in. and 5 in. 33
2½ and 2¾ in.	32	3 ¼ to 4 ½ in. 43

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30, base		85 per cent off list
Carbon 0.30 to 0.40, base		85 per cent off list
Plus usual differentials and extras for cutting. Warehouse discounts range higher.		

Seamless Locomotive and Superheater Tubes

	Cents per Ft.	Cents per Ft.
2-in. O.D. 12 gage....	15	2½-in. O.D. 10 gage.. 20
2-in. O.D. 11 gage....	16	3-in. O.D. 7 gage.... 35
2-in. O.D. 10 gage....	17	1½-in. O.D. 9 gage.... 15
2½-in. O.D. 12 gage....	17	5½-in. O.D. 9 gage.... 55
2½-in. O.D. 11 gage....	18	5½-in. O.D. 9 gage.... 57

Tin Plate

Standard cokes, per base box..... \$5.50

Terne Plate

(Per Package, 20 x 28 in.)		Terne Plate
base	coating	base
8-lb.	\$11.00	20-lb. coating I. C.... \$14.90
base	\$11.00	25-lb. coating I. C.... 16.20
8-lb. coating I. C....	11.30	30-lb. coating I. C.... 17.35
12-lb. coating I. C....	12.70	35-lb. coating I. C.... 18.35
15-lb. coating I. C....	13.95	40-lb. coating I. C.... 19.35

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb..... 2.75c. to 2.80c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb..... 3.50c. to 3.65c.

Automobile Sheets

Regular auto body sheets, base (22 gage), per lb. 5.10c.

Galvanized

No. 28 (base), per lb..... 4.75c. to 4.85c.

Long Ternes

No. 28 gage (base), 8-lb. coating, per lb..... 5.30c.

Tin-Mill Black Plate

No. 28 (base), per lb..... 3.75c. to 3.85c.

Prices of Raw Materials, Semi-Finished and Finished Products

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 55 per cent iron.....	\$5.65
Old range non-Bessemer, 51½ per cent iron.....	4.90
Mesabi Bessemer, 55 per cent iron.....	5.40
Mesabi non-Bessemer, 51½ per cent iron.....	4.75

Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore

Iron ore, low phosphorus, copper free, 55 to 58 per cent iron in dry Spanish or Algerian.....	9.75c.
Iron ore, Swedish, average 66 per cent iron.....	9.50c.
Manganese ore, washed, 51 per cent manganese, from the Caucasus, nominal.....	45c.
Manganese ore, ordinary, 48 per cent manganese, from the Caucasus.....	42c.
Manganese ore, Brazilian or Indian, nominal Tungsten ore, per unit, in 60 per cent concentrates	42c.
Chrome ore, basic, 48 per cent Cr ₂ O ₃ , crude, per ton, c.i.f. Atlantic seaboard.....	\$8.75 to \$10.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York.....	19.00 to 22.00
	75c. to 85c.

Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace, or seaboard, per ton.....	\$107.50
Ferromanganese, British, 80 per cent f.o.b. Atlantic port, duty paid.....	107.50
Ferrosilicon, 50 per cent, delivered.....	75.00
Ferrosilicon, 75 per cent.....	140.00
Ferrotungsten, per lb. contained metal.....	90c. to 93c.
Ferrochromium, 4 to 6 per cent carbon, 60 to 70 per cent Cr. per lb. contained Cr. delivered.....	10.75c.
Ferrochromium, 6 to 7 per cent carbon, 60 to 70 per cent Cr., per lb.....	10.50c.
Ferrovanadium, per lb. contained vanadium	\$3.50 to \$4.00
Ferrocobaltitanium, 15 to 18 per cent, per net ton	200.00

Spiegeleisen, Bessemer Ferrosilicon and Silvery Iron

(Per gross ton furnace unless otherwise stated)

Spiegeleisen, domestic, 19 to 21 per cent.....	\$35.00 to \$37.00
Spiegeleisen, domestic, 16 to 19 per cent.....	34.00 to 36.00
Ferrosilicon, Bessemer, 10 per cent, \$39.50; 11 per cent, \$42, 12 per cent, \$43.50; 14 to 16 per cent (electric furnace), \$40.00.	
Silvery Iron, 5 per cent, \$27.00; 6 per cent, \$28.00; 7 per cent, \$29.00; 8 per cent, \$30.50; 9 per cent, \$32.50; 10 per cent, \$34.50; 11 per cent, \$37.00; 12 per cent, \$39.50.	

Fluxes and Refractories

Fluorspar, 80 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines....	\$20.00 to \$22.00
Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines....	22.00 to 23.50
Per 1000 f.o.b. works:	
Fire Clay:	
Pennsylvania	High Duty \$40.00 to \$45.00
Maryland	45.00 to 47.00
Ohio	40.00 to 43.00
Kentucky	42.00 to 43.00
Illinois	37.00 to 42.00
Missouri	42.00 to 45.00
Ground fire clay, per net ton.....	35.00 to 40.00
	6.00 to 7.00
Silica Brick:	
Pennsylvania	38.00
Chicago	47.00
Birmingham	50.00
Ground silica clay, per net ton.....	7.50 to 8.00
Magnesite Brick:	
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.).....	65.00
Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.).....	40.00
Chrome Brick:	
Standard size, per net ton.....	47.00

Semi-Finished Steel, F.O.B. Pittsburgh or Youngstown, per gross ton

Rolling billets, 4-in. and over.....	\$38.00
Rolling billets, 2-in. and under.....	38.00
Forging billets, ordinary carbons.....	43.00
Sheet bars, Bessemer.....	40.00
Sheet bars, open-hearth.....	40.00
Slabs	38.00
Wire rods, common soft, base, No. 5 to ¾-in.....	\$48.00
Wire rods, common soft, coarser than ¾-in.....	\$2.50 over base
Wire rods, screw stock.....	\$5.00 per ton over base
Wire rods, carbon, 0.20 to 0.40.....	3.00 per ton over base
Wire rods, carbon 0.41 to 0.55.....	5.00 per ton over base
Wire rods, carbon 0.56 to 0.75.....	7.50 per ton over base
Wire rods, carbon over 0.75.....	10.00 per ton over base
Wire rods, acid	15.00 per ton over base
Skelp, grooved, per lb.....	2.20c. to 2.25c.
Skelp, sheared, per lb.....	2.20c. to 2.25c.
Skelp, universal, per lb.....	2.20c. to 2.25c.

Finished Iron and Steel, F.O.B. Mill

Rails, heavy, per gross ton.....	\$43.00
Rails, light, new steel, base, lb.....	1.90c. to 2.00c.
Rails, light, rail steel, base, per lb.....	1.75c. to 1.80c.
Bars, common iron, base, per lb., Chicago mill.....	2.20c.
Bars, common iron, Pittsburgh mill.....	2.40c.
Bars, rail steel reinforcing, base, per lb.....	2.10c. to 2.15c.
Rail steel bars, base, per lb., Chicago mill.....	2.10c.
Cold-finished steel bars, base, Chicago, per lb.....	2.90c.
Ground shafting, base, per lb.....	3.40c.
Cut nails, base, per keg.....	\$3.00

Alloy Steel

S. A. E. Series Numbers	Bars 100 lb.
2100* (1½% Nickel, 10 to 20 per cent Carbon)...	\$3.50
2300 (3½% Nickel)	5.00
2500 (5% Nickel)	\$6.50 to 7.00
3100 (Nickel Chromium)	4.00
3200 (Nickel Chromium)	5.75
3300 (Nickel Chromium)	8.00
3400 (Nickel Chromium)	7.00 to 7.25
5100 (Chromium Steel)	3.75
5200* (Chromium Steel)	7.50 to 8.00
6100 (Chromium Vanadium bars)	4.75
6100 (Chromium Vanadium spring steel).....	4.50 to 4.75
9250 (Silicon Manganese spring steel).....	3.75 to 4.00
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chromium, 0.15 Vanadium).....	4.75
Chromium Molybdenum bars (0.80—1.10 Chromium, 0.25—0.40 Molybdenum).....	4.50
Chromium Molybdenum bars (0.50—0.70 Chromium, 0.15—0.25 Molybdenum)	4.25
Chromium Molybdenum spring steel (1—1.25 Chromium, 0.30—0.50 Molybdenum)	4.75 to 5.00

Above prices are for hot-rolled alloy steel bars, forging quality, per 100 lb., f.o.b. Pittsburgh. Billets 4 x 4 in. and larger are \$10 per gross ton less than net ton prices for bars of same analysis. On smaller than 4 x 4-in. billets the net ton bar price applies.

*Not S.A.E. specifications, but numbered by manufacturers to conform to S.A.E. system.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, carload lots, 36,000 lb. minimum carload, per 100 lb.:

Philadelphia, domestic.....	Buffalo	\$0.265	St. Louis	\$0.43	*Pacific Coast	\$1.15
Philadelphia, export.....	Cleveland	0.215	Kansas City	0.735	*Pac. Coast, ship plates	1.20
Baltimore, domestic.....	Cleveland, Youngstown	0.19	Kansas City (pipe)	0.705	Birmingham	0.58
Baltimore, export.....	Comb.	0.29	St. Paul	0.60	Memphis	0.56
New York, domestic.....	Detroit	0.31	Omaha	0.735	Jacksonville, all rail..	0.70
New York, export.....	Cincinnati	0.29	Omaha	0.705	Jacksonville, rail and water	0.415
Boston, domestic.....	Indianapolis	0.31	*Denver	1.15	New Orleans	0.67
Boston, export.....	Chicago	0.34	*Denver (pipe)	1.17		

*Applies minimum carload 80,000 lb. †Minimum loading 46,000 lb.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 35c.; ship plates, 40c.; ingots and muck bars, structural steel, common wire products, including cut or wire nails, spikes, and wire hoops, 40c.; sheets and thin plates, 40c.; sheets No. 12 gage and lighter, 50c.; rods, 40c.; wire rope cables and strands, 45c.; wire fencing, netting and stretcher, 40c.; pipes not over 12 in. in diameter, 55c.; over 12 in. in diameter, 2½c. per in. or fraction thereof additional. All rates per 100 lb. in carload lots, minimum 36,000 lb.

FABRICATED STEEL BUSINESS

Awards of 30,000 Tons, Including Tank Work, and 50,000 Tons Under Inquiry

Nearly 30,000 tons of structural steel work was booked in the past week, including 18,300 tons of tank work, and to the pending list was added over 50,000 tons, following the 55,000 tons of a week ago. The signs of reviving buoyancy in building construction are reported both from Chicago and New York. In the East considerable public work is imminent, for subway construction in New York and Philadelphia, and for public school buildings, particularly in New York. Awards include:

Power house at Oakland, Md., 200 tons, to the Bethlehem Steel Co.

United Gas Improvement Co., boiler house at Sioux City, Iowa, 600 tons, to Mississippi Valley Structural Co.

Subway extension, Westchester line, New York, 450 tons, to American Bridge Co.

Amherst College, baseball cage, 200 tons, to Boston Bridge Works.

Chesapeake & Ohio Railroad, bridge at Ashland, Ky., 300 tons, to unnamed fabricator.

Apartment house, Albany, N. Y., 200 tons, to the Syracuse Steel Co.

Texas Co., automobile storage racks for various plants, 700 tons, to Jones & Laughlin Steel Corporation.

National Fireproofing Co., Hobart, Ind., plant addition, 225 tons, to Jones & Laughlin Steel Corporation.

Maryland Refining Co., 40 oil storage tanks, 12,000 tons, to Chicago Bridge & Iron Works.

Standard Oil Co. of Louisiana, oil storage tanks, 3800 tons, to Riter-Conley Co.

Humble Oil Co., oil storage tanks, 2500 tons, to Petroleum Iron Works.

Santa Fe System, building units 6, 9 and 10 for mechanical department, San Bernardino, Cal., 3000 tons, to American Bridge Co.

Illinois Power & Light Corporation, power plant, Des Moines, Iowa, 1800 tons, to Des Moines Bridge & Iron Co.

Mendota, Minn., arch centers for a bridge, 1296 tons, to Duffin Iron Works.

St. Olaf's College, chemistry building, Northfield, Minn., 230 tons, to St. Paul Foundry Co.

Missouri Pacific Railroad, deck plate girder spans, St. Louis, 226 tons, to American Bridge Co.

Elks Club Building, Moline, Ill., 100 tons, to Davenport Machine & Foundry Co.

Michigan State Prison, cement plant, Chelsea, Mich., 100 tons, to Wisconsin Bridge & Iron Co.

Marquette-Menominee Paper Co., tainter gates and miscellaneous steel, 125 tons, to Lakeside Bridge & Steel Co.

Bell-Zoller Mining Co., Ziegler, Ill., plant alterations, 100 tons, to Wisconsin Bridge & Iron Co.

E. L. Phillips Co., New York City, electric power transmission towers, 450 tons, to Bancroft-Jones Corporation.

Standard Sanitary Mfg. Co., foundry at Louisville, Ky., 300 tons, general contract awarded to L. W. Hancock & Co.

Public Service Co., Orlando, Fla., gas holder, 500 tons, to Stacey Mfg. Co.

Ancaester Building, Cleveland, 450 tons, to Republic Structural Iron Works.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

United Illuminating Co., Bridgeport, Conn., power house, 900 tons.

Philadelphia, Erie Avenue bridge, 300 tons.

Penn Athletic Club, Philadelphia, 6000 tons.

Philadelphia subway work, 10,000 tons, bids to be received July 15.

Public Service Corporation of New Jersey, substation at Kearny, N. J., 700 tons.

Keith's Theater, Siegel Building, Boston, 800 tons.

Denver, Colo., gas holder, 2000 tons, bids being taken.

Miami, Fla., gas holder, 500 tons, bids being taken.

Big Four Railroad, girder spans, 200 tons, bids close June 27.

H. H. Meyer Packing Co., Cincinnati, addition, 200 tons, bids being taken.

Salvage Corporation Building, Cincinnati, 200 tons, bids being taken.

Huntington, W. Va., garage, 200 tons, bids in.

Columbia Power Co., Cincinnati, power plant, 3700 tons, bids in and award expected this week.

Chesapeake & Ohio Railroad station, Ashland, Ky., 750 tons, deferred indefinitely.

Combination office building, hotel and theater, Randolph and La Salle Streets, Chicago, 7500 tons, bids taken.

United Masonic Temple building, Randolph Street, Chicago, 7000 tons.

Glendive, Mont., State bridge, 1000 tons, general contract awarded to McGuire & Blakeslee, Great Falls, Mont.

Mankato, Minn., academy building, 200 tons.

Southwestern Bell Telephone Co. building, St. Louis, 7500 tons.

Marcy-Hurst apartment building, Erie, Pa., 400 tons.

May Structural Business 9 Per Cent Off from April

WASHINGTON, June 17.—Sales of fabricated structural steel in May reported by 167 firms to the Department of Commerce, totaled 141,209 tons, representing 59 per cent of capacity as against 158,326 tons in April, representing 65 per cent of the capacity of those reporting. The computed tonnage shipped in May was 153,400 or 71 per cent, as against 169,000 tons, or also 71 per cent of those reporting in April.

RAILROAD EQUIPMENT BUYING

Fresh Inquiries for 4500 Cars and 40 Locomotives

With an inquiry for 3500 cars for Mexico and for 1000 additional for a Missouri Pacific subsidiary, fresh interest is taken in the railroad equipment field. Prices are being asked also on 40 locomotives as noted among the following items:

The Baltimore & Ohio will take bids on June 19 for 80 motor cars for use on Staten Island.

The New York Central is asking prices on 15 Pacific type locomotives and 25 switching engines.

The Missouri Pacific inquiry for refrigerator cars is for its subsidiary, the American Refrigerator Transit Co., and calls for 2000 cars instead of 1000 as reported last week.

The Western Fruit Express has placed 1000 underframes with the Standard Steel Car Co.

The Mexican Government is inquiring for 3500 freight cars of various types.

Industrial Notes

Plant and equipment of the Barney & Smith Car Co., Dayton, Ohio, offered at public auction, June 12, brought a bid of \$278,400 on the property offered. As the appraised value of the real estate is \$500,000, and it is necessary to have a bid of at least two-thirds of the valuation, it is probable that sale of the plant will not be approved.

Construction is under way on an addition to the plant of the Springfield Spring Co., Springfield, Ohio. General Manager Ralph Thatcher says when it is equipped the company will be able to control the manufacture of its entire product. It will have equipment for processing and drawing of its own wire.

The Grant Gear Works, 151 Pearl Street, Boston, is moving to a building recently purchased at B and Second Streets, South Boston.

The Jenkins Brothers Co., Bridgeport, Conn., recently opened its new five-story plant. Farnham Yardley, president, officiated at the dedication and gave an historical address upon the company, which was established in Bridgeport about 60 years ago.

The Norwalk Iron Works, Norwalk, Conn., has been sold on a bid of \$365,000 to the bondholders of the company, who recently obtained a Federal court order to re-open the plant. No other bid was received.

Stockholders of the Penn Seaboard Steel Corporation have authorized the sale of 10,000 shares of no par common and 5000 shares of preferred stock of the Penn Steel Castings Co., a subsidiary. The Penn Seaboard Steel Corporation, according to President Warren, desires to dispose of its holdings in that company so that it can concentrate its activities on the products of its Newcastle plant. It is proposed to install a finishing mill at that plant.

NON-FERROUS METALS

The Week's Prices
Cents per Pound for Early Delivery

June	Lake	Electro-	Straits		Lead		Zinc	
			Tin	(Spot)	New York	New York	St. Louis	New York
11.....	12.87½	12.50	42.12½	7.12½	6.95	6.10	5.75	
12.....	12.75	12.37½	42.37½	7.10	6.95	6.15	5.80	
13.....	12.75	12.25	42.62½	7.12½	6.95	6.20	5.85	
14.....	12.75	12.37½	43.75	7.15	6.95	6.20	5.85	
16.....	12.87½	12.37½	43.75	7.20	6.95	6.20	5.85	
17.....	12.75	12.37½	44.75	7.25	6.95	6.20	5.85	

*Refinery quotation; delivered price ¼ c. higher.

New York

NEW YORK, June 17.

There is very little life to any of the markets. Copper prices are easier but tin quotations are higher, due to the London market. The lead market is the strongest with prices a little higher than a week ago. There has been very little change in the zinc market.

Copper.—Consumers of copper are not in a position to make large purchases and there has not been much demand from abroad. The market here is swayed to and fro by London prices which are also being watched by consumers and operators on this side. When London advances there is a little buying here and, when prices recede there, prospective purchasers stay out of the market. As a result of this condition quotations during the week went lower and are now back to a level just under that prevailing a week ago. The minimum for electrolytic copper is 12.62½c., delivered, with some producers asking 12.75c. There is, however, no activity or life to the market and it is largely marking time. Lake copper is quoted at 12.75c. to 12.87½c., delivered.

Tin.—The feature of this market is the strength of the London market in the face of extreme dullness on this side. There has been very little business in the last week and no pressure to sell on the part of importers and dealers. Total sales have been small with consumers almost entirely out of the market. On some days it was difficult to locate the price level. Yesterday a little business was done but it was insignificant and today the market has been inactive. Because of the dullness here and of the sharp decline in consumption of tin, the trade is interested to know why London should continue to advance, prices there being about £10 per ton higher than a week ago. Some suggest that another bull campaign may be in the making on the other side. London prices today were £226 for spot standard, £225 15s. for future standard and £229 for spot Straits. The quotation for spot Straits tin here today was 44.75c., New York. Arrivals thus far this month have been 2350 tons with 4837 tons reported afloat.

Lead.—The market is stronger on the strength of good buying and fairly heavy consumption. In the outside market the metal has sold as high as 7.25c., New York, or 6.95c., St. Louis. The price of the leading interest continues at 7c., New York, but an advance in this would not surprise the trade if it should take place soon.

Zinc.—The feature of the week was the publication of the statistics of the American Zinc Institute for May which showed a large increase in stocks and a production for the month close to the second largest monthly output for nearly two years. This has been a surprise when it is considered that the market price is considerably below the cost of output, with ore selling around \$39 per ton. The market is not active, but there has been a little business for domestic account together with some export inquiry. Reduced operations in the steel and brass industries are naturally reflected in this market. Prime Western for early delivery is quoted at 5.85c., St. Louis, or 6.20c., New York, with a small premium for future positions.

Nickel.—Quotations for shot and ingot nickel are unchanged at 27c. to 32c. per lb., with electrolytic nickel held at 30c. to 32c. by the leading producers. Shot and ingot nickel in the outside market are quoted at 28c. to 32c. per lb.

Antimony.—Chinese metal for spot and June delivery is quoted at 8.30c. to 8.45c., duty paid, New York, in wholesale lots.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted by importers at 26.50c. to 27c. per lb., duty paid, delivered.

Old Metals.—The market follows new metals closely and as a result is very uncertain. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	12.25
Copper, heavy and wire	11.00
Copper, light and bottoms	10.00
Heavy machine composition	9.75
Brass, heavy	7.75
Brass, light	6.50
No. 1 red brass or composition turnings	8.50
No. 1 yellow rod brass turnings	7.25
Lead, heavy	6.00
Lead, tea	5.00
Zinc	4.25
Cast aluminum	16.00
Sheet aluminum	16.50

Chicago

JUNE 17.—Tin and lead have advanced, while copper has declined. Tin has gained strength as a result of speculation and also the buying movement started by the recent recession in prices. Lead buying has also been heavier, possibly because users regard prices as low. Copper is a drug on the market, while zinc is firmer, though quiet. For the old metals there is more inquiry than for three months and prices on certain copper, lead and brass grades have advanced. We quote in carload lots: Lake copper, 13c.; tin, 45c.; lead, 7c.; spelter, 5.85c.; antimony, 10.50c., in less than carload lots. On old metals we quote copper wire, crucible shapes and copper clips, 10.50c.; copper bottoms, 8.75c.; red brass, 7.50c.; yellow brass, 6.50c.; lead pipe, 6c.; zinc, 3.75c.; pewter, No. 1, 20c.; tin foil, 26c.; block tin, 30c.; all buying prices for less than carload lots.

In connection with some of the Bureau of Standards work it has been noted that ultra-violet light appears to accelerate the atmospheric corrosion of polished metal surfaces. That is, portions of the metal exposed to the light became tarnished, while parts which had not been exposed remained bright. These results may lead to the development of a method for indicating the liability of metals to corrosion or the formation of a superficial oxide film. A few specimens of steel and brass have been prepared and the work will be continued.

The Algoma Steel Corporation, Sault Ste. Marie, Ont., has shut down a considerable portion of its plant during the past week, when about 1000 men were laid off. The rail mill suspended operations June 10; No. 3 blast furnace was blown out, and No. 2 furnace is expected to be banked. No. 4 blast furnace will continue in blast for the present. The open-hearth furnaces finished making steel June 11, and closed down. The 18-in. and 12-in. merchant mills will continue to operate for some time to come.

The Industrial Machinery Division of the Bureau of Foreign and Domestic Commerce has issued Trade Information Bulletin No. 209, entitled "Ice-Making and Cold-Storage Plants in South America," and No. 229, "Ice-Making and Cold-Storage Plants in Mexico, Central America, and West Indies." Copies can be obtained upon application to the Industrial Machinery Division, Bureau of Foreign and Domestic Commerce, Washington, or any of the district or cooperative offices of the bureau.

PERSONAL

Dr. William Campbell has been appointed first Howe Professor of Metallurgy at Columbia University, filling the new chair created in honor of the distinguished service of the late Henry Marion Howe, professor of metallurgy from 1897 to 1913, and president of the American Institute of Mining and Metallurgical Engineers in 1893. Dr. Campbell, long a member of the faculty of the Columbia School of Mines, Engineering and Chemistry, and internationally known as a metallurgist, was born at Gateshead-on-Tyne, England, in 1876. He was Carnegie Scholar in 1902 and Barnard Fellow in 1903. During the war he was a commander in the United States Navy and is now consulting metallurgist to the New York Navy Yard.

E. L. Wyman, for several years a member of the sales department of the Mark Mfg. Co., Steel & Tube Co. of America and Youngstown Sheet & Tube Co. at Chicago, has been appointed sales manager of Clayton Mark & Co., manufacturers of wrought steel pipe and well supplies with plant at Seventy-fourth and Robey Streets, Chicago.

V. G. Bench, for more than three years assistant superintendent of 1-4E blast furnaces, South Works, Illinois Steel Co., Chicago, has been appointed assistant superintendent of blast furnaces at the Gary, Ind., works of the company.

Robert Harbison Booth, assistant to the president of the Bridgeport Brass Co., became general manager of Whitney-MacDonald, Inc., pipe bender, Philadelphia, on June 16. He became associated with the Bridgeport company in 1918, as superintendent of rates and labor, and was a member of the committee that conferred on behalf of Bridgeport manufacturers, with the Administrator of the National War Labor Board in the development of the Bridgeport Plan of shop committees. Before going to Bridgeport he was for eight years engaged in consulting industrial engineering, part of that period with Fred A. Kerry & Staff. Two years previous were spent with the Bettendorf Steel Car Co. as assistant general inspector. Following graduation from Massachusetts Institute of Technology in 1905, he went with the Republic Iron & Steel Co. as labor foreman. Mr. Booth is a member of the American Society of Mechanical Engineers.

Walter G. Troup has been made sales manager of the North & Judd Mfg. Co., New Britain, Conn. Formerly he was associated with the firm, but more recently was employed in Cleveland.

Duane T. Molthrop has opened offices at 451 McCormick Building, Chicago, under the name Molthrop Supply & Mfg. Co. He is Chicago representative of the William B. Pollock Co., Youngstown, Ohio, fabricator of hot metal cars, blast furnaces and other types of steel plate construction. He is also conducting a brokerage business in fabricated steel and plain material, including structural shapes, plates and bars. Mr. Molthrop was formerly assistant secretary of the Vierling Steel Works, Chicago, with which company he was identified for 14 years.

J. C. Merwin, works manager Chain Belt Co., Milwaukee, was elected second vice-president at the annual meeting on June 12. C. Raymond Messinger was re-elected president and Clifford F. Messinger, first vice-president. Brinton Welser was elected secretary and Carl L. Pfeiffer was reelected treasurer. Mr. Merwin is a graduate of Sheffield Scientific School, Yale University, and became associated with the Chain Belt Co. in 1917.

Frank R. Bacon, president Cutler-Hammer Mfg. Co., Milwaukee, for 26 years, has been elected to the newly created position of chairman of directors. Beverly L. Worden has been elected president. Mr. Worden became a member of the board several years ago. He was one of the founders of the Worden-Allen Co., Milwaukee, and the Lackawanna Bridge Co., Buffalo. After the war he was general manager of the shipbuilding division of the Submarine Boat Corporation.

Robert Hula, assistant traffic director Chicago Association of Commerce, Chicago, resigned, June 16, to become affiliated with Clayton Mark & Co., Chicago, in a sales and traffic capacity. He has had long experience in the steel industry, having formerly been traffic manager of the Steel & Tube Co. of America.

A. J. Dietrich, Dietrich Brothers, Baltimore, has been appointed chairman of the steel and copper mills group of the Baltimore Safety Council. Other firms represented at the meeting held recently by the council were Eastern Rolling Mills, Baltimore Tube Co., Baltimore & Ohio Railroad Co., A. Weiskittel & Sons Co., Armstrong & Parker, Maryland Dry Docks Co., G. Krug & Son and Baltimore Car & Foundry Co.

K. A. Hills, since January attached to the Davenport, Iowa, sales office of the General Electric Co., recently was made manager of the office, covering a large part of Iowa. He has been with the company since May, 1910. S. E. Gates, for 14 years in charge of the Spokane, Wash., office, has been appointed manager of the Los Angeles office, and Bernhard Olsen, for 12 years at the Spokane office, becomes manager succeeding Mr. Gates.

H. A. Sparrow, a graduate of Rensselaer Polytechnic Institute and formerly assistant sales and advertising manager of the London Steam Turbine Co., Troy, N. Y., has joined the Robert June Engineering Management and Industrial Advertising Organization of 8938 Linwood Avenue, Detroit.

H. B. Kraut, 708 Otis Building, Chicago, has been elected vice-president and general manager of the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. For several years he was machinery export manager for Joseph T. Ryerson & Son, Inc., Chicago.

T. H. Harvey, formerly works manager of the Ohio Steel Foundry Co., Springfield, Ohio, has been chosen vice-president and Ralph Burke, who has been with the Lima works of the company, has been appointed to succeed him. W. J. Gilmore, formerly works manager at Lima, has been given general charge of production at both plants. Mr. Harvey has gone to Canada on a business trip. It is understood that he will devote his energies to the sales department.

G. M. Williams, for several years general manager of the Dayton-Wright Aeroplane Co., Dayton, Ohio, has been elected president of the Nordyke & Marmon Co., automobile manufacturers, following a reorganization of the company.

B. J. Westcott, treasurer American Seeding Machine Co., Springfield, Ohio, has resigned in order to devote more time to his duties as president of the Westcott Motor Car Co.

William C. Prendergast has been appointed district sales manager of the Tacony Steel Co., with headquarters at 2 Rector Street, New York. He was for 14 years active vice-president of the John C. Vance Iron & Steel Co., Chattanooga, Tenn., a connection which he resigned to become export manager of steel products for the Lucey Mfg. Co. Subsequently he was vice-president and general manager of the Vance Import & Export Co. He joined the Tacony company in November, 1923, as manager of the tool steel department, in which capacity it is understood he will continue.

Max Riebenack, 3rd, of Lansdowne, Pa., is connected with the Philadelphia office of the Industrial Works, Bay City, Mich., as district sales engineer. He was formerly mechanical and research engineer with the National Aniline Chemical Co. and the Industrial Separators Co., Philadelphia. Ben W. Beyer, Jr., New York, formerly sales engineer with the Union Special Machine Co., Chicago, is district sales engineer in the New York branch of the Industrial Works.

Morgan P. Ellis, assistant general sales manager of the Economy Fuse & Mfg. Co., Chicago, for eight years, has been appointed general sales manager.

Frederick Maples, who for several years was power director of the Long Island section of the Pennsylvania Railroad, and until recently was connected with Hubbard & Co., Pittsburgh, pole line construction materials manufacturers, has become associated with the Truscon

Steel Co., Youngstown, Ohio, as manager of the newly instituted steel pole department.

Andrew O. Cunningham, who for the past 18 years has been chief engineer of the Wabash Railway Co., has severed this connection and opened an office at 2037 Railway Exchange Building, St. Louis, for the practice of engineering. He will specialize on river improvement, involving revetment and dykes, structural steel work, bridges, etc.

William G. Clyde, general sales manager of the Carnegie Steel Co., received the honorary degree of applied science at the commencement of Pennsylvania Military College, Chester, Pa., this week.

George H. Blakeley, manager of sales for structural material and plates for the Bethlehem Steel Co., with headquarters at Bethlehem, Pa., has been given the honorary degree of Doctor of Science by his alma mater, Rutgers College.

OBITUARY

Frank Bunker Gilbreth

Frank Bunker Gilbreth died suddenly June 14 in a telephone booth at Montclair, N. J., just as he had completed a telephone conversation with Mrs. Gilbreth.



F. B. GILBRETH

The cause of scientific industrial management has lost in his passing a militant exponent, who stood substantially alone as the advocate of the "one best way" to do work. Engineering has lost a man of a fertile brain who was constantly creating new instruments for measuring human effort or devices or mechanisms for conserving human effort. It was his classic studies of waste motion, a quarter of a century ago, particularly in brick laying, which brought him into national prominence, though at that time he was a building contractor of large-scale country-wide operations. When he became actively interested in the Taylor system of management, he approached it from an independently scientific angle, and early espoused and developed methods of recording by means of photographs combined time and motion studies. As a part of his office he had a laboratory where manual operations could be photographed by means of the motion picture camera, and he devised a special clock for measuring fine divisions of time; at times used rapidly pulsating electric lights on operators' hands for studying cycles of manual dexterity; employed the stereoscopic camera for recording motions readily in the three dimensions of space; his uses of the motion picture film were too numerous to attempt here to mention. He has long been an advocate also of considering scientifically the question of fatigue elimination, not only looking into the possibility of better human performance as the result of periodic rest periods of proper duration but providing forms of chairs, foot supports and appliances calculated to relieve workers in some mechanical operations from unnecessary fatigue. As the war was drawing to a close he took, in company with Dr. Lillian M. Gilbreth, his wife, who closely collaborated with him in all his later work, an active interest in methods and mechanisms for rehabilitating crippled soldiers. Major Gilbreth (for he held a staff engineering position in the war), led an exceedingly active life, possessed at one and the same time the attributes of a salesman and a scholar, was

a ready and forceful public speaker, courageous in his convictions, and always showed an innate liking for his fellow man.

Mr. Gilbreth was born at Fairfield, Me., July 7, 1868. He was a member of the American Society of Mechanical Engineers, the Society of Industrial Engineers, the Taylor Society and others. Not long ago he was given an honorary degree of doctor by an American university and recently was decorated by the government of Czecho-Slovakia. He was due to sail this week with Mrs. Gilbreth for England and that country. With Mrs. Gilbreth he was co-author of numerous technical society papers and books, including "Time Study," "Fatigue Study," "Applied Motion Study" and "Motion Study for the Handicapped." He is survived by Mrs. Gilbreth and eleven children. His residence was 68 Eagle Rock Way, Montclair.

FRANK B. MALONEY, general superintendent Union Drawn Steel Co., Beaver Falls, Pa., died at his country home, Darlington, Pa., June 9. He had been confined to his home for six weeks following an accident at the plant, where he fell into a pit. He was 63 years old and had been in the employ of the Union Drawn Steel Co. for 33 years, during 32 of which he had been general superintendent in charge of the two plants of the company at Beaver Falls and its Gary, Ind., mill.

FREDERICK SKELTON, managing director Canadian Shovel & Tool Co., Hamilton, Ont., died at his residence, Haslemere, Burlington, Ont., June 8. He was born in Sheffield, England, 79 years ago. After gaining a thorough knowledge of the steel industry, he came to the United States, and became superintendent of the Terre Haute Shovel & Tool Co., Terre Haute, Ind. In 1904 he moved to Hamilton and established the industry with which he was connected until his death. He was instrumental in founding two large steel companies, one in Ohio and one in Pennsylvania. He is survived by his widow, two daughters and two sons.

RENE T. HUGO, president and general manager Hugo Mfg. Co., maker of industrial appliances, West Duluth, Minn., died June 8 at his home in Duluth, aged 42 years. He was born in Owen Sound, Canada, but was educated in Duluth, to which his family moved when he was a child, and in the University of Minnesota. During the World War he was commissioned lieutenant-commander in the United States Navy and sent to Schenectady, N. Y., to supervise and examine electrical supplies made by the General Electric Co. for the Government.

EDWARD PAYSON WILLIAMS, treasurer Pickands, Mather & Co., Cleveland, since 1891, died June 16, aged 86 years.

COLONEL WILLIAM HENDRIE, president Hamilton Bridge Works Co., Ltd., Hamilton, Ont., died May 26.

HENRY HAVELOCK DICKSON, aged 63 years, president Dickson Car Wheel Co., Houston, Tex., died at his home in that city on May 16. He had been in foundry and machine industry since 1878, when he was general manager of the Marshall Foundry & Machine Co., Marshall, Tex., under his father. Later Mr. Dickson incorporated the Houston Car Wheel Co., of which the Dickson company is successor.

Hope, Scott & Co., Montreal, has purchased the 47,000 tons of material which was designed for the Imperial Russian Government railroads, but which never was shipped, owing to the outbreak of the revolution. The material consists mainly of box-car parts, and the Montreal company purposes to recondition them in Vancouver, where they have been stored for more than eight years, and ship them to Japan for sale. The purchase price has not been announced. The material originally was manufactured by the Canadian Car & Foundry Co., Montreal, and the Eastern Car Co., New Glasgow, N. S., at the order of the British Government. It cost more than \$14,000,000.

Malleable Iron in 31 Hours (Concluded from page 1797)

about two-thirds of the tensile strength. Any of the products here presented conform very closely to this rule. The yield points obtained are of the same order of magnitude as those found in normal steels of the same combined carbon content. * * * The izod impact test on these intermediate products of annealing gave results which remained practically constant at 8 ft.-lb., regardless of the treatment. It is obvious that this value is sharply doubled when completed graphitization has been accomplished. It is of interest to note, however, that this impact value compares very favorably with values for normalized cast steel. * * *

There has been occasion for machining these intermediate products both on a lathe and on a milling machine and they presented no difficulty. The surface produced resembles that of machined steel very closely. It would seem that a cast iron, which by a short treat-

ment can be given properties such as reported, should find commercial uses as a substitute for malleable iron and steels for certain purposes. The yield point is as high as that for normal steels of the same combined carbon content and is superior to that of malleable iron. The shock resistance is comparable to that of steel and though less than that of malleable iron would seem to be ample for many purposes. The ductility also would seem to be ample to allow the slight changes in shape sometimes required in assembling and similar operations. * * *

It is realized fully that the treatments here given differ from those used commercially. Somewhat higher temperatures are used, more rapid temperature changes are involved and the use of any packing material is eliminated. These changes are considered necessary in order to realize the short annealing period obtained in those experiments. * * * It is believed that the employment of a suitable atmosphere with a traveling hearth furnace offers possibilities of making these laboratory treatments commercially feasible.

STEEL AND INDUSTRIAL STOCKS

The range of prices on active steel and industrial stocks from Monday of last week to Monday of this week was as follows:

	Low	High		Low	High
Allis-Chalmers ..	44 1/4	47 1/2	Inland Steel	32 1/2	33
Allis-Chal. pf.	92 1/2	93	Int. Har.	84 1/2	87
Am. B. S. & F. pf.	82 1/2	83 1/2	Int. Har. pf.	108 1/2	108 1/2
American Can.	102%	109%	Lima Loco.	56	59
Am. Can pf.	113 1/2	115%	Midvale Steel.	27	27
Am. Car & Fdry.	162 1/2	162 1/2	Nat. Acme.	7	7
Am. C. & F. pf.	121 1/2	121 1/2	Nat. En. & Stm.	22 1/2	25 1/2
American Loco.	72%	74%	N. Y. Air Brake.	39 1/2	44 1/2
Am. Loco.	119	119 1/2	Otis Steel.	7 1/2	7 1/2
Am. Radiator.	99%	102%	Otis Steel pf.	50	52 1/2
Am. stl. Fdries.	34	35 1/2	Pressed Stl. Car.	45 1/2	47 1/2
Baldwin Loco.	106%	112 1/2	Replogle Steel.	7 1/2	7 1/2
Baldwin Loco. pf.	110 1/2	110 1/2	Republic.	42 1/2	45 1/2
Bethlehem Steel.	45 1/2	48 1/2	Republic pf.	84	85
Beth. Stl. 7% pf.	90 1/2	91 1/2	Sloss-Sheffield.	53	55
Beth. Stl. 8% pf.	103 1/2	104 1/2	Un. Alloy Steel.	22	25 1/2
Br. Em. Steel.	3 1/2	3 1/2	U. S. Pipe.	95%	96%
Br. Em. Stl. 2 pf.	9%	9%	U. S. Pipe pf.	90 1/2	93
Chic. Pneu. Tool.	86	86	U. S. Steel.	94 1/2	97 1/2
Colo. Fuel.	38%	42%	U. S. Steel pf.	119 1/2	121 1/2
Crucible Steel.	48%	52%	Vanadium Steel.	19 1/2	21 1/2
Crucible Stl. pf.	88	89 1/2	Va. I. C. & Coke.	36	36
Gen. Electric.	216%	230%	Whouse Air Br.	89 1/2	90 1/2
Gt. No. Ore Cert.	26%	26 1/2	Y'town S. & T.	63 1/2	64
Gulf States Steel	64	68 1/2			

Plans of New Companies

The Perry Adattractor Co., Meridian, Miss., has been organized with capital stock of \$100,000 to manufacture display fixtures for shop windows. Besides the present plant at Meridian, the company will have one near St. Louis and one in or near New York. Small castings and gears are made by contract. J. M. Perry is president.

The Double Seal Ring Co., 206 Glenwood Avenue, Bloomfield, N. J., has been organized to act as distributor for the Double Seal Ring Co., 1834 Broadway, New York, manufacturer of piston rings. Frank Kohler heads the new company.

The Fedco Number Plate Corporation, New York, has been incorporated with capital stock of 50,000 shares, no par value, and plans the development of a system for numbering frames and engines of automobiles. It will require a considerable length of time before preparation can be made for actual manufacturing. W. H. Wheeler, Federated Engineers Development Corporation, 115 Broadway, New York, is president.

The Fisher Automatic Brush Machine Co., 165 West West Street, Baltimore, has been incorporated to manufacture several sizes of automatic machinery for making solid back brushes. Work is done mainly by contract through the Universal Machine Co., Baltimore. C. E. Fisher is president of the new company.

The United Appliances Corporation, New York, has been incorporated with \$1,000,000 capital stock to act as distributor of certain appliances for locomotives. It will operate through a license contract with a manufacturing corporation. Frank N. Foote, 17 East Forty-second Street, is secretary.

The Graff Motor Coach Co., upon completion of a factory which will cost \$100,000, now under construction at Thirty-seventh Street and Michigan Boulevard, Chicago, will manufacture automobile bodies and operate a repair plant. W. W. Graff is president.

The Independent Automotive Corporation, care of the Colonial Charter Co., Ford Building, Wilmington, Del., has been organized with capital stock of \$5,000,000 to manufacture automobiles and parts. Details of plans for future operation are not completed, but a definite announcement will be made in about 30 days.

The De Mattia Wire Works, Southport, Conn., incorporated with \$50,000 capital stock, will manufacture wire cloth, strainers, coal sieves, coal screens, machinery guards, foundry, miners and hardware riddles, etc. It has leased a plant and will start operations without delay. The principals formerly were connected with the Joseph O'Neill Wire Works, Port Chester, N. Y. C. De Mattia heads the new company.

The Pennstate Corporation, Liberty Building, Philadelphia, has been formed to mine foundry sand and to handle foundry specialties. S. H. Cleland is president.

The Metal Fibre Rope Co., 1817 Vermont Avenue, Toledo, Ohio, organized with capital stock of \$30,000, will manufacture towing lines of metal fiber. William Manoff is president.

The M. & S. Mfg. Co., 296 Church Street, Hartford, Conn., incorporated with capital stock of \$50,000, will manufacture metal specialties for the present, but plans to turn out special forms of machine tools and speed counters later. Robert H. Mather heads the company.

The Keystone Machine & Engineering Co., 2114 Farmers Bank Building, Pittsburgh, is a re-organization of the company by that name, whose plant at Oil City, Pa., was destroyed by fire last March. It has purchased a going plant at Sharon, Pa., and will continue the manufacture of filtration equipment and special machinery. It will also do general machining and casting. Present capital of \$100,000 will be increased soon. Officers are: T. A. Oakley, president, and J. G. Bassett secretary-treasurer.

The Southern Stave Saw & Machine Co., 301 South Eighteenth Street, Birmingham, Ala., has been organized with \$25,000 capital stock to manufacture saws and special machinery. It has plant and equipment for present needs. A. W. Hafsted heads the company.

The R. E. M. Cement Products Co., Mount Holly, N. J., organized with capital stock of \$100,000, has completed a plant for manufacturing construction blocks, posts, etc. A. J. Mullen is president.

The Farm & Home Machinery Co., Orlando, Fla., has been organized to act as distributor of agricultural equipment, pumps, lighting plants and irrigation outlets. E. E. Rhoades is one of the principals.

Sales of the Wickwire Spencer Steel Corporation for the quarter ended March 31, aggregated \$8,126,897; for the corresponding period last year they were \$8,274,023. Little variation in operating expenses for the two periods is noted, they being \$7,260,481 and \$7,255,229, respectively. Operating income was \$866,416, whereas in the same period in 1923 it exceeded \$1,000,000. Net profit for the quarter was \$155,189, equivalent to \$2.02 a share on preferred stock, compared with \$417,207, in the first quarter of 1923. Profit and loss surplus stood at \$6,090,235, against \$6,491,149 a year back. Inventories on March 31 were \$6,170,434, and on the same date last year, \$6,803,688.

Steel Metallurgy of the British Empire

(Continued from page 1791)

\$185,000,000, of which amount \$50,000,000 represented iron unmanufactured and partly manufactured, pig iron, billets, blooms, rails, structural material, wire rods, plates, etc. If these materials and the additional quantity required for the fabrication of \$135,000,000 worth of more highly wrought commodities were produced in Canada instead of being imported, Mr. Cameron estimates an increase in the output of Canadian iron and steel furnaces of three or four times the present annual average.

Indian Iron and Steel Industry

H. M. Surtees Tuckwell of London described in his paper, "The Iron and Steel Industry of India," the rise, the present position and future prospects of development in the industry of that country. The extensions to the Tata company's works begun during the early stages of the late war, and comprising two big American blast furnaces of 500 tons daily capacity, with their complement of coke-ovens, open-hearth furnaces, blooming mills, rail mills, plate and sheet mills ordered in the United States, are now practically completed, and will give the Tata works a productive capacity of 600,000 tons of pig iron, and 570,000 tons of steel per annum.

The Bengal Iron Co.'s works comprise five blast furnaces with a production capacity of 200,000 tons of pig iron per annum, also four batteries of 34 Simon-Carves by-product ovens, with a capacity of 250,000 tons of coke per annum. A ready market for the pig iron is found in all the principal railroads and iron foundries in India, and it is exported to Ceylon, Straits Settlements, Australia and New Zealand. The blast-furnace plant of the Indian Iron & Steel Co., Ltd., consists of two 350-ton mechanically charged modern furnaces, capable of being increased to 500 tons capacity if required. Ladles of 75 tons capacity convey the hot metal to the double-strand pig machine on the sand-cast pig bed. Coke is produced in two batteries, each consisting of 80 Simon-Carves waste-heat coke-ovens, and there are installed a direct recovery by-product system, a sulphuric acid plant and a power plant.

The United Steel Corporation of Asia owns works having a capacity of 250,000 tons of rolled material per annum, but they will be so designed that they can be expanded to produce 500,000 tons per annum as soon as circumstances warrant. The charcoal blast furnace and wood distillation plant of the Mysore Government Iron Works was opened in January, 1923, and has been working successfully since. The annual output of charcoal pig iron is about 86,000 tons.

Turning to present conditions, Mr. Tuckwell asserts that the depreciated exchanges have enabled Continental manufacturers to dump their goods into India at a cost lower than that at which local manufacturers can produce and that British manufacturers of steel quote, for India, prices which are considerably under cost of manufacture. Under present conditions, Indian steel producers have no foreign market for their goods and must meet serious competition in supplying local demands. There is also a great dependence upon imported labor.

Mr. Tuckwell describes the country as having immense possibilities. Owing to the demand during the war for steel, great impetus was given to prospecting in India, with the result that, while many countries, so far as accessible ores are concerned, are being forced to use lower-grade materials, India has practically untouched fields of richest iron ore, and as the coal and the iron ore are comparatively near each other, opportunity exists to make iron on the spot or to export the ore. Mr. Tuckwell predicts that India will become ere long one of the greatest manufacturers of iron and steel, provided necessary and adequate facilities are granted against unfair competition.

Modern British Blast Furnaces

Fred Clements of the Park Gate Iron & Steel Co., Rotherham, described blast-furnace practice in Great

Britain. He dealt fully with this subject in a paper before the Iron and Steel Institute in 1920, and on the present occasion he emphasizes the constructional aspect of the four representative furnaces selected. A comparison of the operating results given in the former paper and on the present occasion shows that generally the newer furnaces are larger and capable of greater outputs. This development was inevitable, in view of the need for greater economy, not only in fuel, but also in operating costs, and the experience gained in the larger furnaces should do much to remove the reluctance which has been generally shown to install units of increased dimensions.

The argument that a small furnace is more easy to control, and therefore can be relied upon to give a more regular and superior class of iron, is not borne out by actual fact. The height and diameter of the stack are naturally the two factors which influence its cubic capacity, and the design of a satisfactory means of distributing the burden over a top diameter of large dimensions would permit the next step to be taken in the development of the blast furnace, namely, a general increase in the diameters and consequently in the capacity. There is no basic connection between the height of the stack and the diameter of the bell, but the deductions which have been made after long experience and observation lead the author to suggest that the following relations represent the best practice:

Furnace Height, Ft.	Bell Diameter, Ft.
65 to 75.....	9
75 to 85.....	10
85 to 95.....	11
95 to 105.....	12

Mr. Clements enunciates the following contributing factors to insure efficient results:

- (1) The general lines of the furnace must be maintained very closely to their original shape through a long campaign lasting not less than five years.
- (2) The materials charged should be regular in size and contain nothing above the dimensions of a 4-in. cube.
- (3) The materials must be distributed with perfect regularity over the whole of the furnace. The distributing gear should be so designed that the operator has control over the distribution.
- (4) The operator should have an efficient indicating gear which shall give him a correct idea of the height of the burden and its distribution with the minimum amount of effort on his part.
- (5) The blowing plant, whether reciprocating engines or steam turbo-blowers, should be able to supply blast well above the maximum demand of the furnace, and should be capable of easy regulation. The furnace, however, should be supplied with a constant weight of air suitable for its condition at any particular time. The blast should never be taken off the furnace unless under conditions of urgent necessity.
- (6) The stove capacity installed must be sufficient to keep the blast temperature well up to the desired level without a wide fluctuation in the maximum and minimum temperatures.

Works Problems and Methods of Fuel Economy

Reviewing certain aspects of the subject of fuel economy from the internal viewpoint of metallurgical works practice, Sir Robert Hadfield states, in a paper with the title above, that owing to the many variable factors met with in the works there is a limit to the application of exact methods, and he shows how far rapid approximate methods can be made use of in controlling fuel utilization. In shops where variable classes of work are constantly being put through, there is difficulty in suiting the furnace to the job, and the practical limit of realizable economy is reduced. The geometrical factor, both as regards furnace and material, is the dominant influence in such cases. In many instances, if any section of the furnace space could be occupied with more material, the efficiency of the furnace would be increased practically in direct proportion. Cases frequently arise where the disposition of the material is decided by questions of temperature distribution, such as uniformity, and provide a conflict between fuel and metallurgical requirements, which tends to make such heating operations inefficient and

to militate against rational progress in furnace technology.

With regard to the operation of melting which is considered by Sir Robert as distinct from that of refining, it is claimed to be on the "melting" efficiency of the open-hearth that the best indications as to the efficiency of the furnace as a thermal machine should be based. For control purposes, the best index is given by the ratio of the rate of gasification of the fuel (in cwt. per hour) to the rate of melting in tons per hour. Such values, as well as other salient indices—such as rates of output, fuel ratios, etc.—should be charted and a continuous record kept.

Temperature Colors

Sir Robert Hadfield refers to the question of temperature colors, that is, the self-luminous colors of the heated body commonly known under various vague descriptions such as red heat, yellow heat, and so on, especially with regard to their utilization in estimating temperatures, as distinct from the exhaustive means usually associated with the more accurate scientific inquiry, which are not always practicable under manufacturing conditions. Sir Robert, with the aid of W. F. Northend of Sheffield, has prepared a temperature color chart on which the different colors are indicated by varying temperatures from 500 deg. C. or 600 deg. C. to approaching 2000 deg. C. This chart was put to the practical test at the Hadfield works, the furnaces being adjusted to various temperatures covering a range of from 700 to 1400 deg. C., and the individual testing the chart was asked to find a color on the chart which he considered to be the nearest match, using for the purpose a screen of black paper in which a horizontal slot had been cut. No hint of information was given as to the actual temperature of the furnace, and the temperature scale was also previously removed from the color chart so as to leave him entirely unbiased. On the whole, the results were good; practically all the observers were able to find a satisfactory color match for each temperature chosen, so that it may be taken, Sir Robert considers, as a pretty good representation of the colors of heated objects. While the use of such a chart is not advocated except in the total absence of impracticability of other means of determining temperature, even that of the eye of an experienced workman, it is believed by Sir Robert that since such charts find a use, the one described by him will be found a better guide than some which have hitherto been published.

Alloy Steels

In a further address, discussing "The Development of Alloy Steels," Sir Robert Hadfield asserts that we are passing out of the age of iron and simple steel and that we have advanced into an era which may be termed an age of alloy steels. He predicts that the use of alloy steels will develop and become of still further importance to the world. Research in this direction is showing that the possibilities are as yet exploited very incompletely.

The paper treats the subject historically and then takes up manganese steel, silicon steel and modern alloy steels.

Metallurgy of Special Steels

Dr. W. H. Hatfield, of the Brown-Firth Research Laboratories, in a paper "Modern Developments in the Metallurgy of Special Steels," deals with modern developments under three headings: (1) Improvement in process of manufacture and manipulation resulting in increased reliability; (2) modified and new compositions resulting in improved or new properties, and (3) a more intimate knowledge of the properties of steel from the designer's standpoint.

He remarks that engineers have of late developed considerable interest in regard to the strength and ductility of steels tested transversely or tangentially. It is not yet generally recognized by engineers that when ingots of 60, 70 and 100 tons are cast, it is difficult to guarantee homogeneity. One of the most noticeable features of modern engineering is the blitheness with which engineers will specify the use of larger

and larger masses of steel, particularly in the case of the construction of turbines where, Dr. Hatfield states, forgings are produced from masses so large that it is difficult for the works staff engaged in producing the steel to guarantee that such large parts shall have the degree of homogeneity and freedom from internal defects which is necessary for complete safety.

He suggests that the best way to make a turbine disk is to produce a cylindrical bloom from the ingot, section it transversely into blocks, and then forge the "cheeses" so produced, with the ingot axis in the vertical position. The material which will then constitute the disk is deformed in such a way that the steel is extended laterally. This forging of the block into a disk is accomplished at one heat by forging on a mechanically revolved table, the steel being deformed tangentially, the tool employed insuring that the steel flows in a radial and also in a circumferential direction. He claims that by this method of manufacture a really mechanically reliable disk is produced. Dr. Hatfield gives grounds for insisting that the steel used in the production of the important parts used in modern engineering, particularly in power plants and transmission parts, should be as free from sulphur and phosphorus as commercial considerations will permit.

Alloy Steels for Bridges

Dr. Hatfield advocates the extended application of alloy steels in connection with bridges and similar structures. Tie-bars carrying main stresses, essentially tensile, could with advantage be produced in, say, 3 to 3.50 per cent nickel steel in the oil-hardened and tempered condition, which material would have a tensile strength of 44 to 50 tons, together with an actual fatigue stress under reversal of stress, alternate tension and compression, of 22 tons per sq. in., accompanied by a ductility little short of that obtained in the ordinary carbon structural steels, whereas the latter material would have a fatigue stress of only 10 to 13 tons per sq. in.

With regard to permeability, experiments at the Brown-Firth Laboratories show that chromium and manganese reduce this, but that nickel, if added, would increase the permeability. It is now possible, said Dr. Hatfield, to obtain a rotor shaft in which tensile strength is obtained by using a steel containing a lower carbon and higher nickel, with a permeability considerably exceeding that which would be obtained if the tensile strength had been obtained by increasing the carbon content.

Railroad Steels

E. H. Saniter of Sheffield shows, in a paper on this subject that although the British productive capacity of various steel products for use in connection with railroads has been very largely increased during recent years, the exports are much less, and he asserts that an adequate supply will be available when the demand comes along. The production, in Great Britain of steel rails (including grooved tram rails) during 1923 amounted to 708,000 tons; the quantity exported during that year being 306,904 tons. Mr. Saniter considers that in those countries where enormous outputs per unit are obtained as compared with Great Britain, the lack of sufficient time and the rushing of the process is seriously detrimental to the quality of the steel in many ways. He added that the question of the detrimental effect of high phosphorus in American Bessemer and European basic Bessemer is very serious with reference to the question of safety and suitability of these steels for railroad purposes.

Problems of Research

The number of foundries in Great Britain producing iron castings is approximately 3000, but many of them are extremely small local jobbing shops, employing a mere handful of men, and not concerned with the production of castings to meet severe conditions. But, according to J. G. Pearce, "The British Cast Iron Research Association," the future line of development does not lie in a mere increase in the quantity of cast iron produced, but with the improvement of cast iron to meet special service requirements. Mr.

Pearce points to the extraordinary development of the steel industry and the astonishing position secured by the malleable iron industry in America as instances of the prestige which a material can secure when backed by consistent search for improvement. He traces the growth of the research association movement with particular reference to the British Cast Iron Research Association, which was incorporated in June, 1921, and includes among its members gray-iron and malleable iron founders and engineers in the leading industries.

The value of the association in acting as a technical focus for the industry, and as a liaison between industry and the universities and government departments, has already been proved.

Coke Oven Practice

G. A. Hebden of Rotherham in a paper "Comparative Survey of Coke Oven Practice in Various Countries," states the points to be aimed at in coking practice to be (a) the building of larger units, with the use

of a more regular and consistent quality of coal, and (b) the adoption of every appliance which tends to increase the speed and reduce the cost of operation.

Comparing American with British and European carbonizing practice, he shows that the main difference lies almost entirely in the universal and exclusive use of silica materials for ovens throughout, with consequent higher temperatures and shorter coking period, the general use of large ovens, and the laying out of plants in such a manner as to reduce the man and machine power to a minimum. In Europe a complete coke-oven plant is carbonizing about 150 tons of coal per day as against 1200 tons per day, and in some sections 2400 tons of coal per day, in American practice with the same complement of men. Mr. Hebden gives the European output as less than 8 tons per man, youth or boy employed throughout the organization against up to 14 tons per head in American plants. He advocates the basing of practice on centralization and efficient distribution, as in America.

Trade Changes

Leonard R. Nourie has opened an office at 1426 Park Building, Pittsburgh, for the sale of machine tools. He has been appointed district representative of the Niagara Machine & Tool Works and the Joseph T. Ryerson & Sons.

The Ohio Foundrymen's Association has moved offices from the Century Building, Cleveland, to 5713 Euclid Avenue.

Miller, Carson & Co., Inc., has moved general offices to the Cunard Building, 220 South Sixteenth Street, Philadelphia.

The Chicago Pneumatic Tool Co., New York, announces the removal of the Los Angeles branch, 307 East Third Street, to the company's new building, 655 Santa Fe Avenue.

J. H. Williams & Co., makers of drop-forgings and drop-forged tools, have completed the transfer of manufacturing operations of their Brooklyn and Chicago factories to the Buffalo works, where all domestic manufacturing is now concentrated. After July 1 district sales offices and warehouses will be maintained at 75-77 Spring Street, New York, and 117 North Jefferson Street, Chicago. In New York, E. J. Wilcox will be sales manager of stock, and P. Rigby of special products for the Eastern territory. N. P. Linde will be in charge of stock at Chicago and A. C. Nuth in charge of special products for the Western territory.

George M. Jeffery has opened an office at 149 Broadway, New York, and will act as manufacturers' sales representative for steel companies.

Outside interests are reported to be negotiating to merge the Keystone Steel & Wire Co., Peoria, Ill., the Kokomo Steel & Wire Co., Kokomo, Ind., and the Crawfordsville Wire & Nail Co., Crawfordsville, Ind. An audit is now being made of the books of these companies, but the point has not yet been reached for making a definite proposal for the consolidation.

G. R. LaPage, vice-president and sales manager Jenkins Machine Co., Sheboygan, Wis., woodworking machinery, moved to Chicago, June 1, to establish a central sales organization in behalf of a number of woodworking equipment builders of various types that are non-competitive. These include the Jenkins company; Baxter D. Whitney Co., Winchendon, Mass.; Mattison Machine Works, Rockford, Ill., and Greenlee Brothers Co., Rockford. Mr. LaPage will remain vice-president of the Jenkins company. Similar central sales offices are being established by the same interests in New York, Boston, Greensboro, N. C., Indianapolis, Detroit and Grand Rapids, Mich.

The Ulster Iron Works, with principal office at Dover, N. J., will hereafter conduct the sales of the products of its mill, which are staybolt and engine bolt iron, through its own sales organization. Howard A. Gray has been appointed general manager of sales, with headquarters at the Chicago branch office, People's Gas Building, and Henry T. Bradley is Eastern sales manager, with headquarters at New York. E. W. Kavanagh, C. F. Barton and John H. Craigie will also represent the Ulster Iron Works.

The Toledo Machinery Exchange, Inc., 29 North St. Clair Street, Toledo, Ohio, has moved to larger quarters at 18 North St. Clair Street, in a building recently purchased by the company.

The Meachem Gear Corporation, Syracuse, N. Y., has not been able to move into the plant recently purchased at 122 Dickerson Street. Its address will continue to be 411 Canal Street.

The Pennsylvania Pump & Compressor Co., Easton, Pa., has appointed L. D. Burke of 68 Starr Street, New Haven, Conn., as sole representative for Connecticut.

The Chicago Pneumatic Tool Co. has opened a branch office at 210 South Jefferson Street, Dallas, Tex. J. C. Bailey is in charge.

The Ramsey Chain Co., Inc., Albany, N. Y., has appointed the Morse Engineering Co., 549 West Washington Street, Chicago, as Chicago representative. P. A. Morse is head of the new connection.

The Vrabek, Kessler Co., 149 Broadway, New York, who for the past year has represented, in the New York district, Alfred Box & Co., Philadelphia; Stearns Conveyor Co., Cleveland, and the Stedman Foundry & Machine Co., Aurora, Ind., have dissolved partnership and released their agencies. For the present the Stedman company and the Alfred company will handle business in the New York territory from the home offices. The Stearns Conveyor Co. has appointed N. L. Fleck representative and taken over the office at 149 Broadway. H. H. Kessler is now associated with W. H. Baker, president Acme Cement Corporation, Catskill, N. Y., a previous associate for several years in the Atlas Portland Cement Co. J. S. Vrabek has not yet announced a permanent connection.

The Emerman Co., Erie, Pa., dealer in scrap iron and steel, announces the employment of Louis W. Landay, formerly in the Pittsburgh office of the Hyman-Michaels Co., as Pittsburgh district manager.

The Barrett-Cravens Co., 1328 Monroe Street, Chicago, is doubling present capacity by building a four-story addition, which when completed will make the plant the largest in the country, devoted to the manufacture of lift-trucks and portable elevators.

Industrial Finance

The Fisher Body Corporation reports net earnings for the fiscal year ending with April of \$22,102,008, after taxes and charges, compared with \$17,172,176 in the previous year. Surplus for the year after payment of dividends was \$15,393,811 against \$11,223,658 the year before.

The Dunbar Drop Forge Co., 2506 West Twenty-first Street, Chicago, has filed a voluntary petition in bankruptcy, showing liabilities of 175,204 and assets of \$56,331.

Stockholders of the Westinghouse Electric & Mfg. Co. at the annual meeting held June 11, approved an increase in common stock from \$125,000,000 to \$200,000,000. President Herr explained the purpose of the increase was to put the company in a position to secure funds through the sale of the stock as the needs of its business required. There is no intention of early issuance of the stock. L. A. Oborne and H. P. Davis were elected directors succeeding James C. Bennett and William H. Woodin.

Receiver's report of the Hydraulic Steel Co. for April shows net sales of \$583,496 and net profit of \$53,985 after expenses. Sales from last October to April 30 were \$3,149,078 and net profits, \$263,904.

Germany's Prospects as Trade Competitor

Low Living Costs and Present Long Workday Give Promise of Heavy Exports in Future—"Neutral" Markets to Be Cultivated

BERLIN, GERMANY, May 31.—The Reichstag election of May 4 had among its other effects a marked strengthening of the ultra-protectionist groups, and a serious weakening for the social-democrats who, as before the war, are the only free trade party. The strongest party in the new Reichstag, the German national, is successor to the pre-war German conservative party, which always stood for prohibitive duties. The German people's party, which contains the Republic's ablest personalities, is only the pre-war national-liberal party under another name, and as such it stands resolutely for industrial high duties. Only one-fifth of the Reichstag is free trade. The Minister of Industry, Dr. Hamm, the Food Minister, Count von Kanitz, and numerous other authoritative persons have declared that when in January, 1925, Germany regains her tariff independence, under Article 486 of the Versailles Treaty, she must increase her import duties. At present there is a particularly strong agitation to exclude American aluminum.

Against this is the inevitable German pressure to increase exports. The Dawes reparations scheme, like all other conceivable schemes, involves the creation of a considerable export surplus. Some first class authorities, among them Dr. Schacht, Reichsbank president and creator of last winter's currency reform, declare confidently that Germany can create such a surplus. Yet in the first four months of this year she exported goods worth only 1,835,689,000 gold marks against imports of 2,790,333,000 gold marks. Can Germany nevertheless within a few years so reverse these tendencies that she will be able to produce the annual export surplus of 2,500,000,000 gold marks which is fixed as normal in the Dawes report? Put otherwise, is German competition in the coming years likely to be increasingly severe?

German Competition in "Neutral" Markets Held to Be Inevitable

In a recent conversation with our correspondent, Dr. Schacht expressed no doubt that the answer is "Yes." The only possible obstacle, he added, is that ally countries, disliking competition more than they like reparations, may continue to exclude German goods. This, however, will not prevent German international competition once Germany proves able to produce more than she consumes, and so achieves the first condition precedent to reparations. One of the best German experts on trade problems declares that in this case the surplus goods, instead of going to ally countries, will go to former neutral countries and so kill ally export trade to these neutral countries. The question, he says, is: "Can Germany compete?" During the past post-war years she dumped to a certain extent, but she did not on the whole seriously threaten her competitors, the reason being that home consumption, owing to the "flight from the mark," was always enormous. "When," says the authority quoted, "owing to home consumption declining as a result of the special reparations burden, home-produced goods accumulate, nothing can prevent their finding their ways into world markets."

This view probably is sound. A survey of the present condition of German industry yields the conclusion that Germany not only must compete seriously, as all reparation plans require, but also can compete. In Northeast Europe a new kind of German competition is being felt. It is the result of a cheapening of German production, due to the much prolonged working hours in force since the beginning of the year. Swedish, Danish and Finnish newspapers declare that German "social dumping" has replaced the former "exchange

dumping." All these countries have a more or less qualified 8-hr. working day.

Lengthened Workday Has Resulted in Improvement in Output and Lower Costs

Since the suspension of the German 8-hr. day by the Marx cabinet last autumn, German working hours in finishing manufactures have been 55 to 60 weekly, and the same hours prevail in the heavy iron and steel trades. The last arbitral decision in Ruhr coal mining retains, it is true, the 7-hr. day for workers underground, but it adds that for the present one additional hour must be worked. Except in underground mining, the 8-hr. day now exists only in certain unhealthy industries.

Even the socialists (e.g., the Berlin *Vorwaerts*) admit that the lengthening of the working day has led to a corresponding increase in production. The Union of Saxon Machinery Manufacturers declares that, as against a lengthening of the working day by 16 per cent, output increased 18 per cent. Another Saxon industrial association (textiles) reports that a 54-hr. week instead of the former 44 hr. has led to a decrease of 11.4 per cent in the wage item in the cost of average goods. Naturally the absolute earnings of workmen have considerably increased as a result of the longer hours.

Absolute wages, as reported lately from here to THE IRON AGE, remain very low, lower than before the war, and much lower than in any other great industrial country. The difficulty which Germans in some branches have had of late in competing is not due to wage causes. First cause was the heavy franc decline of last winter, which for a time cheapened French and Belgian iron, steel and machinery. This factor no longer operates. A factor still operating is the dearness of credit. Long-term credit cannot be had under 60 per cent; and there is no immediate prospect of alleviation. Dr. Schacht this week told the Reichsbank that "industry in the credit question must look after itself;" he refuses to expand credit, stating that if he does so he must increase the note circulation, and that this would endanger the stability of the new renten mark and of the stabilized paper mark. No concern which pays 60 per cent on money borrowed for working capital can produce cheaply.

Yet another factor is overhead charges. These are enormous. The clerical and technical staffs of big industrial concerns have increased out of all proportion to the manual producing staffs. This is an outcome of the former mistaken official policy of over-regulating industry, forcing it to pay a multitude of small taxes, some of which were not worth collecting, and requiring it to send in returns on every conceivable subject. The Marx-Stresemann cabinets here put through some useful reforms, but to some extent the abuse still obtains. The 8-hr. day further caused a disproportionate increase in the number of clerical and technical employees, who formerly had worked longer than the manual employees. These factors made for high production costs.

Accurate Cost Accounting Discarded During Wild Inflation Period

Finally, the art of costing died during the inflation years. In those years prices never could be foreseen for 24 hours ahead. Manufacturers simply guessed in round numbers, ignoring odd billions and later even odd trillions of marks. This system passed muster because there was no competition. After the currency

stabilization, loose costing continued out of mere habit, and also because goods could be sold at home at almost any price. An inquiry before the Reichswirtschaftsrat as to the causes of the enormous prices of textiles has brought out the fact that the main cause was not dear raw material or inefficient technical methods, but overhead charges, costly borrowing, and the universal practice of "rounding" prices instead of cutting them fine.

All these evils are inevitable results of the four years of inflation; and they will be slowly got over. Dr. Schacht holds that if only credit interest rates become normal industrial production costs would drop 20 to 25 per cent. It is generally allowed, however, that credit conditions will not become normal unless capital is obtained from outside. One argument with industrial men for accepting the Dawes report is that under it Germany would almost immediately get about 1,000,000,000 gold marks in foreign credits and another similar amount within two years. The *Frankfurter Zeitung* shows that these credits will reduce production costs and foster exports. This is logically necessary in view of the fact that the whole Dawes plan depends upon German export surpluses.

With Low Living Costs, Germany's Ability to Compete Undoubted

In spite of the above disadvantages the German gold price level as a whole remains extremely low; and of late it has fallen again. The cost of living is 15 per cent above that of 1913; the wholesale index is 20.2 per cent above. Only certain classes of goods are much dearer than foreign, chiefly textiles and leather; and here the price fall has begun. Germany's ability to compete in iron, steel and machinery never has been open to doubt except during a short period when franc exchange was abnormally low; and even then France and Belgium were the only countries producing more cheaply than Germany.

The Dawes report rightly showed that German industries issued from the four years' inflation ordeal well equipped technically and potentially strong. Their financial situation is not so clear as their technical; and will not be shown until they issue their balance sheets in gold marks, as a law of last winter requires. Meantime they have the enormous advantage that, under Chancellor Marx's third taxation decree, all their pre-war bonded debts, except 15 per cent which is left as a douceur to their creditors, have been wiped out. It is therefore reasonable to conclude that industry is better than ever equipped to compete and to export, and that the Allies will ultimately get reparations in a form which will not altogether please them—in form of a throwing of German goods upon world markets, while Germany as a buyer in world markets will have small importance.

British Pig Iron and Steel in May

LONDON, ENGLAND, June 16 (By Cable).—The pig iron production in May of 650,900 gross tons was the second largest this year and compares with 618,400 tons in April. Total steel output in May was 809,700 tons, also the second largest this year.

Comparative production figures for the British steel industry in gross tons per month are as follows:

Pig Iron	Steel Ingots and Castings
1913, per month.....	855,000
1920, per month.....	669,500
1921, per month.....	217,600
1922, per month.....	408,300
1923, per month.....	619,800
January, 1924.....	631,500
February.....	612,700
March.....	668,600
April.....	618,400
May.....	650,900
	639,000
	755,600
	302,100
	486,000
	707,400
	690,100
	767,600
	825,200
	711,500
	809,700

The totals for the first five months are 3,182,100 tons of pig iron and 3,804,100 tons of steel. The average pig iron output to June 1, this year, has been 636,400 tons per month and the steel 760,820 tons per month; both in excess of the monthly rate in 1923.

Reduced Construction Activity in May

The May building record for the 36 Eastern States showed a decline, according to F. W. Dodge Corporation. Total May building contracts in these 36 States (which include about seven-eighths of the total construction activity of the country) amounted to \$419,-272,600. The decrease from the previous month was 3 per cent; from May, 1923, 13 per cent. While there were substantial increases over April in New England, the Northwest, and the Southeastern States, the remaining sections showed falling rates of activity. Construction is holding up at a relatively higher rate in the Southeastern States than in any other section included in this report.

Total construction started from January 1 to June 1 has amounted to \$1,934,240,800, an unprecedented figure, being an increase of 11 per cent over the corresponding period of last year, which established a high record. The increase in New York City on the five-months' record has been 101 per cent; outside of New York City there has been a decline from last year of nearly 3 per cent.

Analysis of the May record shows 44 per cent for residential buildings, 16 per cent for public works and utilities, 13 per cent for commercial buildings, 10 per cent for educational buildings and 7 per cent for industrial buildings. Residential and industrial buildings and public works declined in May; commercial and educational buildings increased.

Contemplated new work reported last month amounted to \$574,639,000, which was 5 per cent less than the amount reported in April and 10 per cent less than the amount reported in May of last year.

May building contracts in New York State and northern New Jersey amounted to \$109,971,200. This was a decrease of 35 per cent from the very high April record, although it was 27 per cent over the figure for May of last year. Last month's total included 48 per cent for residential buildings, 16 per cent for commercial buildings, 12 per cent for educational buildings, and 7 per cent for public works and utilities.

May building contracts in the Central West (Illinois, Indiana, Iowa, Wisconsin, Michigan, Missouri, Kansas, Oklahoma, and Nebraska), amounted to \$95,909,400. The decrease from April was 13 per cent; from May of last year, 18 per cent. Last month's record included: 47 per cent for residential buildings, 18 per cent for public works and utilities, 13 per cent for commercial buildings, and 10 per cent for educational buildings.

Millholland Line Purchased by Gisholt Company

The syndicate of firms owning the Millholland Machine Co., Indianapolis, having passed through a receivership, the Millholland company was recently forced to liquidate. The plant buildings and equipment were sold and will be devoted to other lines of business.

Gisholt Machine Co., Madison, Wis., purchased the business, including the stock of finished machines, the parts in process, good will, trademarks, patents, patterns, drawings, jigs, tools, fixtures, etc., and will continue at Madison the manufacture and sale of Millholland machines which have gained an enviable reputation.

Real Earnings Increased

Figures of the National Industrial Conference Board, New York, show that the purchasing value of weekly earnings in April was 32 per cent higher than it was in July, 1914. This means that the weekly wages divided by the cost of living factor were 32 per cent above the pre-war situation. This represents a slight increase over the March figure, due to a drop in the cost of living between March and April, which was more than sufficient to counterbalance the decrease in weekly earnings from \$26.89 in March to \$26.67 in April.

Machinery Markets and News of the Works

BUYING LIGHT

Cleveland Board of Education Inquires for Metal and Woodworking Machines

Plan Being Devised to Finance Improved Railroad Shop Tools

Although fair business is reported by some companies, taken as a whole the net volume of business during the week has been light. For the most part the bookings have been for single machines.

Machine tool business in May shows that orders received were barely at one-fourth the rate at which they were taken in the first quarter of 1920. According to records of the National Machine Tool Builders' Association the orders in May show a recession of 13.3 per cent from the bookings of April and of 26.5 per cent from the March basis. Unfilled orders at the end of May dropped off 7.9 per cent from the volume at the end of April and compared with the end of March show a drop of 27.8.

Among new inquiries is that of the Cleveland Board of Education for 18 machines, five metal working and 13 woodworking. A 96-in. planing machine is wanted by the Atlas Car & Mfg. Co., Cleveland.

It is expected that orders will be placed against the extensive list of Chicago Board of Education within the coming week.

The General Electric Co. continues to send out inquiries from Schenectady for machine tool equipment for the Japanese General Electric Co. In the aggregate the lists are the largest in years from any one company, and if all of the tools are bought that are inquired for, the purchasing will run up to a large amount. Mitsui & Co. have notified those to whom the General Electric inquiries have been sent that the actual purchasing will be in their hands.

More is heard of the promise of the method of purchasing railroad shop tools and machinery along the lines of the trust certificates for railroad rolling stock equipment. It is reported that such a program is under consideration in at least two places. F. J. Lisman & Co., investment securities, New York, are endeavoring to devise a plan for the sale of bonds of the class mentioned.

New York

NEW YORK, June 17.

THE General Electric Co. continues to send out inquiries from Schenectady for machine-tool equipment for the Japanese General Electric Co. In the aggregate the lists are the largest in years from any one company, and if all of the tools are bought that are inquired for the purchasing will run up to a large amount, probably exceeding anything since war years, with the possible exception of purchases made by the Ford Motor Co. several months ago. Mitsui & Co. have notified those to whom the General Electric inquiries have been sent that the actual purchasing will be in their hands. This apparently eliminates another Japanese house, the Asano Bussan Co., which sent out identical lists about two months ago.

No particular improvement in machine-tool buying is noted, although orders received last week by one or two companies were better than those of preceding weeks. Among the orders received here were the following: Union Pacific Railroad, locomotive wheel-quartering machine and a 5-ft. radial drill; Westinghouse Electric & Mfg. Co., East Pittsburgh, 3½-in. spindle horizontal floor borer; St. Louis-San Francisco Railroad, a 2000-lb. steam hammer; Louisville & Nashville Railroad, 36-in. x 12-ft. planer; Missouri Pacific Railroad, two 100-ton bushing presses; American Steel & Wire Co., 6-ft. vertical boring and turning mill; Honolulu Iron Works, Honolulu, H. I., 42-in. vertical boring and turning mill.

Sacks & Rosenblatt, Inc., care of Samuel B. Pollak, 63 Park Row New York, attorney, organized to operate a general iron works, has acquired property 50 x 200 ft., on Casanova Street, extending through to Tiffany Street, and will have plans drawn at once for a plant to occupy the entire site.

Bids will be asked early in August for a two-story service and repair building, 100 x 200 ft., at 248-54 West Sixtieth Street, New York, for the Automobile Club of America, 247 West Fifty-fourth Street, estimated to cost \$75,000. Frederick Meister, 539 West Fifty-sixth Street, is architect.

The United States Steel Products Co., 30 Church Street, New York, is reported to have concluded negotiations for the purchase of 7 acres at Huntington Park, near Los Angeles, as a site for a Pacific Coast works and distributing plant.

The J. S. Tilley Ladder Co., Second Street, Watervliet, N. Y., has construction in progress on a four-story addition, 70 x 90 ft., estimated to cost \$140,000 with equipment, for which a list has been prepared. Most of the machinery will be electrically-operated.

The Stokes Coal Co., 17 East Forty-second Street, New York, has acquired the entire block bounded by 141st, 142nd Streets, Fifth Avenue and the Harlem River, for a new storage and distributing plant, to include coal pockets, conveying and hoisting machinery, bulkhead with unloading equipment, etc. A one-story automobile service and repair building for company trucks will also be built. Gerald Kenlon is president.

The Bureau of Foreign and Domestic Commerce, Washington, has information regarding a waterworks project in a city in Mexico, for which equipment will be purchased, including two centrifugal pumps, one refraction pump, storage tank of 1,000,000 gal. capacity, two 80-hp. motors, and other apparatus. Reference No. 133231.

Mechanical and engineering equipment will be installed in the new three-story and basement building to be erected by the Board of Trustees, Rensselaer Polytechnic Institute, Troy, N. Y., estimated to cost \$300,000, for which a general contract has been awarded to the Amsterdam Building Co., 138 East Forty-fourth Street, New York.

Electric motors, conveying machinery, tanks and other equipment will be installed in the three-story plant to be erected on Nassau Avenue, Brooklyn, by Kienle & Co., 109 South Fifth Street, manufacturers of inks, estimated to cost \$100,000. A one-story automobile service and repair works will also be built. William H. Gompert, 171 Madison Avenue, New York, is architect.

Corry B. Comstock, 110-12 West Fortieth Street, New York, architect, has completed plans for a three-story automobile service, repair and garage building, 100 x 145 ft., at 163-69 East 127th Street, estimated to cost \$150,000 including equipment.

The Ferrer Sugar Co., Cienfuegos, Cuba, Dr. Juan Silva, attorney, is disposing of a bond issue of \$1,500,000, a portion of the proceeds to be used for the purchase of the railroads, field equipment and plant of Central San Lino, and for extensions and improvements in grinding mills and other departments. Jose Ferrer is president.

The Crane Market

THE electric overhead crane market is showing more activity than for some time and considering the business now pending some fairly satisfactory orders should be closed in the next few weeks. Among current inquiries is one for two cranes from the United States Metals & Refining Co., Carteret, N. J. The Southern Railway has been receiving bids from contractors for shops at Atlanta, Ga., which, it is said, will include seven or eight overhead cranes. The New York Central & Hudson River Railroad, has been receiving bids on a 10-ton gantry crane and recently contracted with a crane builder for alteration of a 100-ton overhead crane into a 175-ton, double trolley crane. The Champion Fibre Co., Canton, N. C., has closed on an 85-ft. bridge for a crane on hand. The Pennsylvania Railroad, Philadelphia, is expected to close shortly on the two gantry cranes recently in the market for bids. The list of 11 overhead cranes ranging up to 25-tons for the Sparrows Point plant of the Bethlehem Steel Corporation, is among the prominent lists attracting the attention of crane builders.

Among recent purchases are:

Thomas E. Murray, New York, a 100-ton overhead traveling crane for the Utica Electric Co., Utica, N. Y., from the Cleveland Crane & Engineering Co.

General Electric Co., Schenectady, N. Y., two 100-ton overhead traveling cranes for Pittsfield, from the Niles-Bement-Pond Co.

William F. Kinney, New York, a 10-ton electric traveling crane for a warehouse of the New York Edison Co., on West Forty-second Street, from the Shaw Electric Crane Co.

Ford Motor Co. of Canada, Toronto, two 3-ton cage control monorail hoists, from the Shepard Electric Crane & Hoist Co.

Champion Coated Paper Co., Hamilton, Ohio, a 1-ton, 20-ft. 8-in. span, 3-motor, underhung crane, from the Shepard Electric Crane & Hoist Co.

Gould Mfg. Co., Seneca Falls, N. Y., a 3-ton, 3-motor, single I beam crane, from the Shepard Electric Crane & Hoist Co.

Clinchfield-Portland Cement Co., Coreen, Ga., a 6-ton, 73-ft. span, 4-motor grab bucket crane from the Shepard Electric Crane & Hoist Co.

Manning, Maxwell & Moore, New York, a 5-ton, 30-ft. span, 1-motor, double I beam hand power crane from the Chisholm-Moore Mfg. Co.

Long Island Railroad Co., a 30-ton, 50-ft. boom, used Ohio locomotive crane, for Jamaica, N. Y., from Philip T. King, New York.

Fraser-Brace & Co., St. Louis, a 30-ton used Brownhoist locomotive crane from Forsythe Brothers, 30 Church Street, New York.

Manual training equipment will be installed in the addition to be erected at the Columbus high school, New Rochelle, N. Y., estimated to cost \$400,000, for which revised plans will be prepared and new bids asked on a general contract. Gilbert, Whitehill & Dobbin, 709 Sixth Avenue, New York, are architects.

The William Krauss Garage Corporation, 127 West Ninety-ninth Street, New York, has filed plans for a two-story addition to its present three-story service, repair and garage building to cost \$100,000. William Shary, 41 Union Square, is architect.

The New York Steam Corporation, 280 Madison Avenue, New York, will make extensions and improvements in its three-story steam generating plant at 2-10 Burling Slip, to cost \$20,000. A fuel economizer system will be installed.

The New York Central Railroad Co., C. S. White, purchasing agent, Room 344, 466 Lexington Avenue, New York, will take bids until June 23 for switches, frogs, switch points, guard rails, etc., as per serial contract 17-1924.

Fire, June 7, destroyed the machine shop at the plant of the Borgfeld Machine Works, Durham Road, Metuchen, N. J., with loss reported at \$17,000 including equipment. It is planned to rebuild.

A four-story factory at 26-28 Prospect Street, Newark, N. J., occupied for a number of years by the Mundy Hoisting Engine Co., has been acquired by Banister & Pollard, 206 Market Street, hardware products, and will be remodeled for a general distributing works.

The Goodwin Motor Corporation, Plainfield, N. J., has acquired property at 320-22 Park Avenue, and will have plans drawn for a three-story service and repair building, 50 x 100 ft.

The Common Council, Plainfield, N. J., will take bids on a general contract about July 1 for a municipal automobile service and repair building, 50 x 85 ft., on South Avenue, for city motor trucks and automobiles. Alfred M. Korf, 151 North Avenue, is architect. John J. Carroll is city clerk.

The Newark Sugar Refining Co., Newark, temporary office Room 526, 765 Broad Street, recently organized with a capital of \$5,000,000, is perfecting plans for the erection of a refinery and distributing plant on the ship channel, Port Newark, comprising 8 acres of land, for which negotiations are in progress for purchase from the city. It will include a power house and machine shop, and is estimated to cost \$1,500,000 with machinery. Adolph Segal, Philadelphia, is at the head of the new company.

The Borough Council, Metuchen, N. J., will take bids until June 23, for pumping equipment and other apparatus for a new sewage system and disposal works. Plans on file at the office of the Borough clerk, Edward A. Burroughs, or office of the engineer, Room 1406, West Street Building, New York.

The Middleburg Mfg. Co., Middleburg, N. Y., has been organized with \$100,000 capital stock, \$36,000 paid in, and will manufacture brake shoes for automotive use, a coal gas consumer and like products. It is in the market for machinery. Otto Schumann, Jr., is one of the heads.

Philadelphia

PHILADELPHIA, June 16.

THE Atwater Kent Mfg. Co., Philadelphia, manufacturer of electric and wireless equipment, is removing its business from 4937 Stanton Avenue to its new building at Wissahickon Avenue and Abbottsford Road, recently constructed at a cost of \$1,000,000. Considerable additional machinery will be installed. A. Atwater Kent is president and treasurer.

The Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, has awarded a general contract to Irwin & Leighton, 126 North Twelfth Street, for a one-story electric generating station at Christian and Schuykill Streets.

The Berrodin Automobile Supply Co., 713 North Broad Street, Philadelphia, has plans for a three-story factory, 58 x 130 ft., at Broad and Olive Streets, estimated to cost \$145,000 with equipment, on which work will soon begin. Philip S. Tyre, 1509 Arch Street, is architect.

In connection with its proposed branch plant at Chicago, for which a general contract recently was awarded to J. W. Snyder & Co., 116 South Michigan Avenue, Chicago, the Electric Storage Battery Co., Nineteenth and Allegheny Streets, Philadelphia, has preliminary plans for another unit with distributing plant on adjoining site on the Western Boulevard, near Forty-seventh Street, and expects to proceed with erection as soon as the first unit has been completed. D. H. Burnham & Co., 160 North La Salle Street, Chicago, are architects.

The Foreign Trade Bureau, Philadelphia Commercial Museum, has received an inquiry from Nicolas Ch. Sounoglou, Mytilene, Greece, desiring information regarding American watch-making tools, No. 42369; from La Perla Joyeria, Francisco D. Palacios, 16 Comercio Street, Ponce, Porto Rico, in the market for a machine, operated either by foot, hand or electric power, for manufacturing wire hooks for pendants, etc., No. 42370.

The Penn-Seaboard Steel Corporation, Franklin Bank Building, Philadelphia, has authorized enlargements in its strip steel plant and the installation of additional machinery.

The Board of Education, Philadelphia, is arranging for the installation of oil-burning equipment in the power station at the Southern high school.

The City Council, Philadelphia, has passed an ordinance providing for the establishment of a Municipal Bureau of Automobiles, in charge of a superintendent to be appointed at once by the mayor, to be in charge of city-owned automobiles and trucks. A measure has also been approved for a two-year lease of a building at Twenty-first and Market Streets, to be equipped as a municipal service, repair and garage. A list of tools, etc., to be installed will soon be arranged.

Pumping machinery, tanks and other equipment will be installed at the new sewage disposal plant to be installed by the Board of City Commissioners, Trenton, N. J.

estimated to cost \$1,000,000. Bids will be called early in July. Col. George A. Johnson is consulting engineer.

The Victor Talking Machine Co., Camden, N. J., has completed plans for two new buildings at its works, estimated to cost \$2,000,000, in conjunction with another structure on which work is now in progress. Eldredge R. Johnson is president.

George Wilcox, Land Title Building, Philadelphia, has awarded a general contract to the Bowden Construction Co., 1935 Chestnut Street, for a two-story automobile service, repair and garage building, at Brief and Fairfield Avenues, Upper Darby, Pa., to cost approximately \$200,000 with equipment. MacKenzie & Wiley, Bankers' Trust Building, Philadelphia, are architects.

The Pennsylvania Power & Light Corporation, Allentown, Pa., will proceed with the construction of its proposed power dam and hydroelectric generating plant on Wollenpaupack Creek, near Hawley, Wayne County, Pa., to develop a maximum of 54,000 hp. The entire project will cost close to \$6,500,000. Local officials of the company, which is operated by the Electric Bond & Share Co., 71 Broadway, New York, are forming a number of subsidiaries, to operate in the different sections for which named, including the Sugarloaf-Columbia Power & Light Co. (Sugarloaf Township); Pine-Columbia Power & Light Co. (Pine Township); Orange-Columbia Power & Light Co. (Orange Township); Benton-Columbia Power & Light Co. (Benton Township); and the Fishing Creek-Columbia Power & Light Co. (Fishing Creek). P. B. Sawyer and C. M. Walter head the new organizations.

The Magee-Evans Colliery, Mount Carmel, Pa., has been acquired by new interests for a reported consideration of \$2,000,000. The new organization has plans under way for enlargements and will install electrically-operated and other machinery.

The Pennsylvania Cement Co., Nazareth, Pa., is inquiring for one or two second-hand 42-in. Fuller-Lehigh coal pulverizers.

The John Wood Mfg. Co., Conshohocken, Pa., is in the market for a gap press, capable of punching 6 x 6-in. holes in 18-gage sheets, center of holes being 18 in. from the edge.

New England

BOSTON, June 16.

NEW ENGLAND industrially is less active than a week ago, the recession being perhaps more marked in metal-working than in other lines. Machine-tool dealers, because of business conditions, were practically destitute of inquiries the past week and sales by local firms were very few and, almost without exception used and of little value. Because of the slackness of business the machine tool houses will remain closed from Thursday afternoon, July 3, until Monday morning, July 7.

Foundations for the two-story, 76 x 150 ft., junior high school to be erected in Malden, Mass., are in. The building will contain a manual training department and cost \$350,000 including equipment. M. A. Dyer, 1 Beacon Street, Boston, is the architect.

Plans are being drawn for alterations by George P. Carver, Inc., 261 Franklin Street, Boston, engineer for the George W. Pickering Coal Co., Derby and Union Streets, Salem, Mass. Conveying equipment will be required.

Sketches are being made for a proposed two-story and basement junior high school to cost \$150,000, exclusive of equipment, for Marlboro, Mass. Manual training departments will be maintained. Edwin T. Simoneau is chairman of the commission. Charles M. Baker, 25 Arch Street, Boston, is the architect.

Contract has been awarded for a three-story 70 x 150 ft., plant by the Marlboro Wire Goods Co., Marlboro, Mass. Hector Molneau is manager. O. D. Kault, 48 Hamilton Street, Worcester, Mass., is the architect.

Plans are completed for a one and two-story office, garage, machine shop, blacksmith shop and other units, to cost approximately \$120,000, to be erected by the city of Lawrence, Mass., on Auburn and Marion Streets. J. Broadhurst, 45 Broadway, Lawrence, is the architect.

The Lux Clock Mfg. Co., Sperry Street, Waterbury, Conn., is planning for a one-story addition, 25 x 103 ft. The foundations will be arranged for a three-story factory and two additional floors will be erected later.

Stevens-Mader, Inc., 75 Exchange Street, Lynn, Mass., operating an automobile service and repair business, has filed plans for a three-story and basement works, 50 x 184 ft., on Mount Vernon Street, estimated to cost \$150,000.

General contract has been let to the Morris Construction Co., Salem, Mass.

The Gamewell Co., Newton Upper Falls, Mass., manufacturer of fire alarm and police signal equipment, is disposing of a stock issue of \$3,000,000, a portion of the proceeds to be used for extensions and improvements. V. C. Stanley is president.

The Cambridge Gas Light Co., 719 Massachusetts Avenue, Cambridge, Mass., will make extensions and improvements in its steam power plant at 354 Third Street, East Cambridge, including the installation of additional equipment, estimated to cost \$40,000.

The Wilton Woolen Co., Wilton, Me., is reported to be planning the construction of a hydroelectric power plant on a site near its mill.

Bondholders of the Norwalk Iron Works Co., South Norwalk, Conn., manufacturer of air and gas compressors, etc., have taken over the property of the company for a consideration of \$365,000. The new owners propose to reorganize the company and resume production at an early date.

The Marine Biological Laboratory, Woods Hole, near Falmouth, Mass., will build a one-story pumping plant in connection with a new three-story and basement laboratory, 100 x 210 ft., the entire expansion will cost \$500,000 with instruments and precision equipment. Coolidge & Shattuck, Ames Building, Boston, are architects.

The Waterbury Buckle Co., 872 South Main Street, Waterbury, Conn., manufacturer of japanned metal and other metal products, has completed plans for a five-story addition, on which work will soon begin.

The Common Council, Ipswich, Mass., has disposed of a bond issue of \$20,000, the proceeds to be used for extensions and betterments in the municipal electric plant.

The Board of Directors, Wheaton College, Norton, Mass., has filed plans for a one-story power house estimated to cost \$80,000. Cram & Ferguson, 248 Boylston Street, Boston, are architects.

Chicago

CHICAGO, June 16.

BUSINESS in machine tools has been unusually dull the past week, but orders will be placed against the extensive Chicago Board of Education list before the close of the present school term. This means that purchases will probably be consummated within the coming week. There will be no further action on the Santa Fe inquiry until after the close of the railroad mechanical convention at Atlantic City. The Burlington list is expected to be bought at any time. Orders from industrial companies are few and far between, and automobile manufacturers in this vicinity who have been steady buyers are notably absent from the market. The Nash Motor Co., however, has added another Heim centerless grinding machine to the equipment at its Milwaukee plant.

The Chicago Nipple Mfg. Co., 1966 Southport Avenue, Chicago, has purchased property on the corner of Southport Avenue and Cortland Street, 144 x 240 ft. The site is improved with a mill constructed building, 124 x 150 ft., adjoining the purchaser's factory, which will be used for enlargements.

H. J. Palmer, 4917 North Mozart Street, Chicago, has awarded contract for a one-story tin shop addition, 40 x 68 ft., at 6006-10 West North Avenue, to cost \$5,000.

The Imperial Pattern Works is erecting a two-story addition on Nicolet Island at 18-20 Hennepin Avenue, Minneapolis, Minn., to cost \$25,000.

Benjamin Lance has taken over the interests of R. F. Birch and J. H. Birch, Jr., in the Geneva Tool & Machine Co., Geneva, Ill. The new owner plans to enlarge the machine and repair departments.

A building permit has been issued to French & Hecht, Davenport, Iowa, for a factory addition to cost \$40,000.

Fire started by a bolt of lightning did several thousand dollars' worth of damage in the polishing department of the Belleville Stove & Range Co., Belleville, Ill.

The business of the United Stoker Corporation, Hammond, Ind., is being removed to LaPorte. Complete equipment has been moved to the new location and the capital stock has been increased from \$25,000 to \$100,000.

Fire originating from a stroke of lightning recently destroyed part of the power plant of the Public Service Co. of Northern Illinois and Joliet, Ill., with an estimated loss of \$100,000.

Fire following a bolt of lightning recently caused heavy

damage at the plant of A. L. Ide & Son, Springfield, Ill., manufacturer of steam engines, iron castings, machinery, etc.

The Fisher Governor Co., Marshalltown, Iowa, manufacturer of engine governors, regulators and other steam specialties, has awarded a general contract to the Tapager Construction Co., Albert Lea, Minn., for its two-story and part basement addition, 60 x 125 ft., estimated to cost \$50,000. H. E. Reimer, Marshalltown, is architect. J. H. Fisher is president.

The Minnesota Power & Light Co., Duluth, Minn., is disposing of a bond issue of \$4,000,000, a portion of the proceeds to be used for extensions and improvements. C. E. Groesbeck is president.

The Transmission Tower Fabricating Co., Monadnock Block, Chicago, recently organized, will operate a plant at Joliet, Ill., for the production of galvanized steel transmission towers, poles, etc. George H. Truman is president.

The City Council, Madison, Minn., M. T. Hoff, city clerk, will take bids until June 27 for one horizontal tubular boiler, capacity 150 hp., with hopper-feed hand stokers, and accessory apparatus.

The City Council, Sioux Falls, S. D., is preparing plans for a one-story addition to the municipal pumping plant, to include the installation of additional pumping machinery. Joseph Schwarz, Minnehaha Building, is architect. Walter Leyse is city clerk.

The Illinois Northern Utilities Co., Dixon, Ill., has acquired the local hydroelectric power plant of the Reynolds Wire Co., and will remodel for a central station. A new building will be erected on the present site, and five 750 kva. generators and auxiliary equipment installed. The expansion will cost about \$500,000.

Manual training and vocational departments will be installed in two new schools to be erected at Centralia, Ill., for which a bond issue of \$60,000 has been approved. The Board of Education is in charge.

Cleveland

CLEVELAND, June 16.

Demand for machine tools continues light with the volume about the same as in the previous few weeks. Orders are confined almost wholly to single machines. There is more demand from automobile plants in the Detroit territory than from other sources in spite of the slump in the industry. One Cleveland company this month sold six turret lathes in single units to Detroit automobile companies and a local manufacturer of drilling machines has booked a few orders from the same source.

The Cleveland Board of Education has issued a list of 18 tools mostly wood-working, which is the only new inquiry of size. The Faegel Motors Co. has purchased several wood-working machines for its Kent, Ohio, plant. The Atlas Car & Mfg. Co., Cleveland, is inquiring for a 96-in. planing machine. The 30 machines in the plant of the Buckeye Engineering Co., Dayton, Ohio, offered at auction last week went mostly to dealers and users in that vicinity. Considerable machinery was also offered at the plant of the Barney & Smith Car Co., Dayton.

The Cleveland Board of Education list for the Collinwood High School.

- One 12-in. jointer.
- One variety saw.
- One 13-in. x 4-ft. lathe.
- One 12-in. x 20-in. wood turning lathe.
- One power mortising machine.
- One belt sander.
- One 16-in. x 60-in. wood turning lathe.
- Two bench saws with stands.
- One band saw with stand.
- One two-wheel grinder with pedestal.
- Two bench jointers.
- One surface planer.
- One 10-in. sensitive drill press.
- One compound punch and shear.
- One 30-in. forming roll.
- One 30-in. squaring shear.

The Parkersburg Machine Co., Parkersburg, W. Va., will erect a new plant, contract for the buildings having been placed with the H. K. Ferguson Co., Cleveland.

The Cleveland Steel Tube Co. is negotiating for the sale of its plant to other interests and has called a meeting of its stockholders for June 23. The company's tube mill plant

was virtually completed some time ago but has never been placed in operation.

The Cleveland Worm & Gear Co., Cleveland, advises that it has not purchased the plant of the Thormart Motor Co., Kent, Ohio, as announced in local publications. The report evidently originated from the fact that the company had some negotiations for the purchase of this plant but its bid was not accepted.

The Biggs Boiler Co., Akron, Ohio, is contemplating the erection of an addition. F. G. Sherbondy is secretary and treasurer.

The W. S. Tyler Co., Cleveland, has placed contract for a two-story and basement extension, 110 x 110 ft.

The Building Products Co., Summit Street and Sandusky Avenue, Toledo, Ohio, is in the market for equipment for a steel fabricating plant. Machines needed include a combination plate and angle shear; triple-gage punch similar to Pels No. 20; air compressor to deliver 200 cu. ft. per min. at 100 lb. per sq. in.; power hack saw; electric monorail hoists, two or three tons, all to be motor-operated for 440 volts, three-phase, 25-cycle, a.c.

Plans are under way for a one-story power house to cost \$25,000 at the plant of the Trump Rubber Co., Inc., East Akron, Ohio, for which some machinery will be required.

Cincinnati

CINCINNATI, June 16.

SOME manufacturers of machine tools report business fairly good, while others say orders are extremely scarce. The general run of sales consists of single machines, but a notable purchase was for six gear hobs by the Buick Motor Car Co. A local company also received orders for three large press brakes. The General Electric Co. continued its purchases, taking a number of tools for which it had inquired some time ago. The Santa Fe Railroad is reported to have closed on part of its recent list, but formal orders have not been sent out. No action has yet been taken on the 30 tools for the Dayton Board of Education, and purchasing by the Norfolk & Western and Southern Railroads is not likely to develop before the end of this week. Inquiries are light and mostly for single tools. Used machinery continues to move in fair volume, though prices are showing a tendency to decline.

The General Electric Co. has awarded contract for a five-story office and warehouse at Cincinnati to cost approximately \$500,000. The building will also be used by the Post-Glover Electric Co., Cincinnati distributor for the General Electric Co. Equipment for handling material, as well as a completely equipped service station, will be installed.

The plant of the Holland-Flynn Mfg. Co., London, Ohio, manufacturer of fence posts and farm gates, has been sold at receiver's sale to J. C. Murray and J. F. Balo. The business and equipment will be moved to Mount Sterling, Ohio, where the new owners will continue operations.

A preliminary permit has been issued to the Kentucky Northern Power Co. for a power project in Licking River, near Falmouth, Ky. Plans include a 90-ft. dam to form a lake 70 miles long and to develop 36,000 hp.

The Kentucky Utilities Co., Louisville, has acquired the plant and system of the Old Dominion Power Co., Norton, Va., and vicinity, and will consolidate with its properties. Extensions are planned, including the installation of additional equipment.

The Cincinnati Steel Castings Co., 1220 Queen City Avenue, Cincinnati, Ohio, has plans for a one-story addition. Fire recently destroyed a portion of the plant which will be rebuilt. Martin Fisher, Brighton Bank Building, is architect.

The Tennessee Paper Mills, Inc., Chattanooga, Tenn., is planning for the installation of electric generators and other power equipment for a company station to be used in connection with the complete electrification of the plant.

The Ross-Meehan Foundries, Chattanooga, Tenn., manufacturers of gray iron castings, have tentative plans for a one-story addition, 120 x 190 ft., estimated to cost \$25,000.

The White Oak Corporation, P. O. Box 1094, Knoxville, Tenn., operating a marble quarry, is in the market for a steam power hoisting engine, with boiler, accessory apparatus, etc., also for an air compressor.

The Tennessee Coal Mining & Timber Co., Chattanooga, Tenn., recently organized with a capital of \$500,000, William Reid, president, is planning the construction of a sawmill,

power house and lumber plant on 20,000-acre tract at Coalmont, Tenn. It is also purposed to build a logging railroad and purchase locomotive and rolling stock.

The Independent Auto Repair Shop, Cincinnati, recently organized, will operate a general machine and parts works at 502 West Court Street.

The Kentucky-Tennessee Power Co., Hopkinsville, Ky., has acquired the municipal power plant at Martin, Tenn., and will remodel for central station service. Additional machinery will be installed, including two 500 kw. generators and auxiliary apparatus.

Buffalo

BUFFALO, June 16.

THIE machine tool market appeared a little brighter last week. A few inquiries have been out for small drills, planers and shapers and some orders were placed. A Niagara Falls high school advertised for bids on two lathes and a couple of drill presses, bids for which are now in.

The Northern New York Utilities, Inc., Watertown, N. Y., is reported to have plans in preparation for a hydroelectric generating station in the vicinity of Sewalls Island, Black River, estimated to cost \$250,000 with machinery.

The New York State Gas & Electric Corporation, Ithaca, N. Y., has plans in progress for extensions and improvements, including the installation of additional equipment, automatic power substations, etc., to cost \$500,000.

The Niagara, Lockport & Ontario Power Co., Buffalo, is planning the erection of a one-story automatic power substation at Sherman, N. Y., to cost \$55,000.

The United States Feldspar Co., Gloversville, N. Y., headed by C. H. Peddrick, Jr., 170 Broadway, New York, has plans under way for a one-story grinding and sorting mill, estimated to cost \$150,000 with machinery. It is expected to begin work during the summer.

The Common Council, Victor, N. Y., plans the installation of electric-operated pumping equipment in connection with proposed extensions in the waterworks, for which bonds for \$50,000 are being arranged. M. Keating is village clerk in charge.

Plans are under way for an electrical power and substation at Sherman, Chautauqua County, N. Y., to cost \$50,000 for the Niagara, Lockport & Ontario Power Co., Lockport, N. Y.

Preliminary plans are under way for an electrical power and sub-station at Sherman, Chautauqua County, N. Y., to cost \$50,000, for the Niagara, Lockport & Ontario Power Co., Lockport, N. Y.

Pittsburgh

PITTSBURGH, June 16.

INACTIVITY in machine tool business continues in this market. The one interesting event of the past week has been the issuance of the regular quarterly list of the Westinghouse Electric & Mfg. Co. which contains about 100 items, mostly for its East Pittsburgh and Sharon plants.

The Bertha-Consumers Co., Chamber of Commerce Building, Pittsburgh, operating coal properties in western Pennsylvania and West Virginia, is disposing of a bond issue of \$2,000,000, a portion of the proceeds to be used for plant extensions and improvements. John H. Jones is president.

The Scohy Sheet Glass Co., Sistersville, W. Va., recently organized, will take over and consolidate the plants of the John B. Scohy Glass Co. and the Independent Glass Co. A fund of \$100,000 is being arranged for extensions and improvements, including the installation of additional machinery. John B. Scohy heads the new company.

The Philadelphia Co., 435 Sixth Avenue, Pittsburgh, operating electric light and power properties, will soon begin the erection of an eight-story service and operating building, 85 x 250 ft., at Sixth Avenue and Cherry Way, estimated to cost \$1,000,000. The W. G. Wilkins Co., Westinghouse Building, is architect. Ralph Rainsford is company engineer.

Four electric light and power companies have been organized by Pittsburgh interests represented by A. W. Robertson and J. R. McNary, 435 Sixth Avenue, attorneys, to be known as the Hampton Township Light Co., O'Hara Township Light Co., Harmar Township Light Co., and the Indiana Township Light Co. The new companies will install and operate plants in the respective territory for which named.

The Builders' Supply Co., Nitro, W. Va., is planning for

the installation of machinery for a woodworking plant, including a planer, rip-saw, and other tools, electrically operated.

Detroit

DETROIT, June 16.

WORK is in progress on additions at the plant of the Gibson Refrigerator Co., Greenville, Mich., including a two-story structure, 60 x 215 ft., for the manufacture of porcelain linings for refrigerators; one-story addition, 100 x 300 ft., for general operating service and distribution; and one-story warehouse addition, 25 x 300 ft. It is expected to have extensions ready for use during August.

The Ford Motor Co., Highland Park, Detroit, will soon begin the erection of a one-story woodworking plant and sawmill, 80 x 250 ft., at its works at Iron Mountain, Mich., to cost about \$85,000. Machinery will be electrically-operated. Albert Kahn, Marquette Building, Detroit, is architect.

The American Etherphone Corporation, 39 West Milwaukee Avenue, Detroit, recently organized to manufacture radio equipment, has acquired the plant and business of the Radio Apparatus Co. and will take immediate possession. Extensions for larger output are planned. J. W. Keenan is president.

The Michigan Artificial Ice Products Co., Real Estate Exchange Building, Detroit, has tentative plans for a new ice and cold storage plant at Sturgis, Mich., estimated to cost \$35,000, with equipment. It is expected to proceed with the work during the summer.

The Flat Wash Window Co., Detroit, manufacturer of window hardware, is reported to be planning for the establishment of a new factory at Chelsea, Mich., and the removal to that place, with installation of additional equipment. Oscar Schettler is head.

Manual training equipment will be installed in the two-story and basement high school to be erected at Hamtramck, Mich., estimated to cost \$250,000 for which bids have been called on a general contract. J. G. Kastler & Co., Detroit Savings Bank, Detroit, are architects.

The Battle Creek Auto Body Co., Battle Creek, Mich., recently organized, has begun the erection of a two-story plant estimated to cost \$30,000.

The State Highway Department, Lansing, Mich., is reported to be considering plans for rebuilding the portion of the State cement plant at Chelsea, Mich., destroyed by fire June 2 with loss approximating \$300,000 including equipment. A portion of the works was used for distributing service.

The Hupp Motor Car Corporation, 3501 East Milwaukee Street, Detroit, has awarded a general contract to the Everett Winters Co., Book Building, for two additions, each one-story, 100 x 120 ft., and 50 x 150 ft., respectively, estimated to cost \$75,000 and \$50,000. The smaller structure will be equipped as a steel block testing works.

The Arcadian Copper Co., Calumet, Mich., has preliminary plans for rebuilding the surface plant at its new Baltic shaft, destroyed by fire several months ago. The installation is estimated to cost \$50,000 and will consist of a steam plant, with boilers and auxiliary apparatus, drill compressor and hoisting machinery.

Indiana

INDIANAPOLIS, June 16.

PLANS are being prepared by the Horner Motor Co., 317 Life Building, Lafayette, Ind., for a one-story and basement service, repair and garage building, 90 x 120 ft., at 625 Columbia Street, to cost \$70,000 with equipment. J. F. Horner is head.

The Cornelius Printing Co., 325 North Capitol Avenue, Indianapolis, will install a power house for operating service at its proposed one-story plant, 120 x 250 ft., with radial brick stack, 36-in. in diameter and 90 ft. high. The entire plant will cost about \$170,000, equipped. The Russell N. Edwards Co., Union Trust Building, is architect.

Electric power and mechanical equipment, conveying machinery, etc., will be installed in the one-story addition to be erected at the plant of the Crown Laundry Co., 2901 East Washington Street, Indianapolis, estimated to cost \$80,000. Walter H. Montgomery is manager.

The Nordyke & Marmon Co., Indianapolis, Ind., manufacturer of automobiles, will remodel a portion of its plant and install additional equipment for increase in output. It is purposed to have the plant ready early in the fall. G. M. Williams is president.

The Board of Trustees, Grass Creek, Ind., is having plans drawn for a one-story manual training addition to the local township school, for which bids will soon be asked on a

general contract. Bacon & Tislow, 31 West Ohio Street, Indianapolis, are architects.

Bids will soon be asked by the Board of Education, Mooresville, Ind., for a one-story power plant for school service, for which plans are being completed by W. H. Garns, Fletcher Trust Building, Indianapolis, engineer.

St. Louis

ST. LOUIS, June 16.

BIDS will soon be asked for rebuilding the municipal electric light and power plant at Willow Springs, Mo., recently destroyed by fire, for which plans are being drawn by the Alexander Engineering Co., Woodruff Building, Springfield, Mo., consulting engineer.

The Southwest Power Co., Huntington, Ark., which recently purchased the Coal District Power Co., with local plant and system, will issue stock and bonds in an amount of \$2,000,000, a portion of the proceeds to be used for extensions and the installation of additional equipment.

In connection with its proposed ice-manufacturing and cold storage plant at Columbia, Mo., to cost \$200,000 with machinery, the Polar Wave Ice Co., 3654 Olive Street, St. Louis, plans the erection of a similar smaller branch plant at Moberly, Mo., to cost approximately \$100,000. Bids for the Columbia plant are expected to be asked at an early date. Joseph Muckerman is general manager.

Manual training equipment will be installed in the new high school to be erected at Great Bend, Kan., estimated to cost \$190,000, for which bids will soon be asked on a general contract. Thomas W. Williamson & Co., Central National Bank Building, are architects.

The Common Council, Potosi, Mo., plans the installation of electrically-operated pumping equipment in connection with extensions and betterments in waterworks and sewerage systems, for which a bond issue of \$50,000 is being arranged. The Alexander Engineering Co., Woodruff building, Springfield, Mo., is consulting engineer.

The Common Council, Higginsville, Mo., contemplates the installation of electric-operated pumping equipment in connection with a new waterworks and sewerage system, estimated to cost \$90,000. E. T. Archer & Co., New England Building, Kansas City, Mo., are engineers.

The Stratton-Warren Hardware Co., 221 East Markham Street, Little Rock, Ark., has tentative plans for rebuilding the portion of its works recently destroyed by fire, with loss estimated at \$275,000 including equipment and stock.

The City Council, Chillicothe, Mo., has awarded a general contract to George P. Reintjes, Kansas City, Mo., for a one-story steam power house at the municipal light and water plant to cost about \$35,000. Other awards will soon be made.

Gulf States

BIRMINGHAM, June 16.

WORK is under way on three one-story additions at the plant of the Florida Machine & Foundry Co., 1561 West Church Street, Jacksonville, Fla., comprising a machine shop, 60 x 140 ft.; metal and wood pattern shop, 60 x 120 ft.; and general storehouse, with distributing works, 60 x 120 ft. F. G. Russell, Jr., is general manager.

A one-story steam-operated electric power plant will be erected at the proposed mill of the Industrial Cotton Mills, Inc., Eagle Lake, Tex., estimated to cost \$350,000. The company was incorporated recently with a capital of \$1,000,000. W. E. Lenhart is president, and Benjamin H. Faber, secretary. The latter will also act as engineer for the project.

The Baton Rouge Electric Co., Baton Rouge, La., is disposing of a bond issue of \$1,000,000, a portion of the proceeds to be used for extensions and improvements.

The United Central Oil Co., Houston, Tex., will begin extensions in its oil refinery on the ship channel, to include the installation of additional equipment. A new storage and distributing works, with capacity of 80,000 bbl., will also be erected on a 10-acre tract about one mile from the refinery. The entire project will cost \$350,000. M. C. Ehlen is vice-president.

The National Petroleum Co., Greenville, Tex., has taken over the former local oil refinery of the North Texas Oil Co., and will make extensions and install additional equipment. The plant has been idle for about three years and is expected to be ready for service during July. C. S. McGee and C. L. Mettler, head the company.

The Deul Power Co., Robertsdale, Ala., will erect a new steam-operated electric power plant estimated to cost \$90,000.

The City Council, Sanford, Fla., will begin the construction of a new power house in connection with

a waterworks system. Pumping machinery will be installed.

The Fortuna Oil Co., Shreveport, La., has acquired the plant and properties of the Continental Asphalt & Petroleum Co., Red River Parish, for \$550,000 and plans extensions and the installation of additional equipment.

W. F. George, 2316 Fifth Avenue, Fort Worth, Tex., has awarded a general contract to Quisile & Andrews, Cotton Exchange Building, for a two-story plant on Taylor Street, 100 x 102 ft., for the manufacture of automobile bodies. It will cost about \$50,000.

The Common Council, Slaton, Tex., plans the installation of electric-operated pumping equipment in connection with a proposed waterworks plant, for which bonds for \$60,000, have been voted. Henry C. McGee is secretary.

The Gulf Refining Co., Port Arthur, Tex., is perfecting plans for extensions in its oil refinery and the installation of additional equipment, estimated to cost \$2,000,000. Headquarters of the company are in the Frick Annex, Pittsburgh.

The Daniels Ornamental Iron & Wire Corporation, 731 Third Avenue, North, Birmingham, recently organized, will erect a one-story plant, 100 x 200 ft. E. W. Conkell is company engineer.

W. H. Kettig, Birmingham, and associates, have awarded a general contract to the Inglenook Construction Co., Birmingham, for a two-story plant to manufacture fertilizer products. It is purposed to organize a company to operate the works, which will cost \$300,000 with machinery. The machinery will be electrically operated.

The Common Council, Oak Grove, La., has arranged a bond issue of \$45,000, for the installation of municipal electric light and power equipment, and waterworks system, with pumping and auxiliary equipment.

T. E. King, Springfield, Ga., formerly owner of the Lumberman Supply & Equipment Co., Savannah, Ga., wants the following machinery for resale: One No. 4 Covell patent Lidgerwood swinger, to attach to Lidgerwood hoist, complete with intermediate gears for meshing into main gear or front drum and bolts; two 15 to 20 kw. or 25 kva. generators direct connected to steam engines, three phase 60 cycle 240 volts, complete with switchboard; also exciter if the generators are not self-exciting; two high pressure locomotive or return tubular type portable boilers, mounted on wheels of sufficient width of face to haul over moderately soft soil, rated horsepower 30 to 40; one water tank of not less than $\frac{1}{4}$ in. steel, with or without top.

Milwaukee

MILWAUKEE, June 16.

MORE life is discernible in the machine-tool trade, although the volume of business is still light. Inquiry has improved the past 10 days, but the recent lull continues so far as actual bookings are concerned. Strict necessities govern demand, which is principally for replacements. Manufacturers and dealers look for a quiet summer, with operations of foundries and machine shops still declining and the establishment of new enterprises at a minimum. The call for used tools is slack.

School District No. 4, Shorewood, Milwaukee County, has directed Herbst & Kuensli, architects, Bartlett Building, Milwaukee, to proceed with plans for the second unit, a manual training wing, of the new Shorewood high school. Contracts recently were let for the first unit, consisting of an administration building and classroom group. Bids on the second unit will be taken after July 1 and equipment will be purchased next fall. Hugo Kuechenmeister is secretary of the board.

The A. J. Lindemann & Hoverson Co., First and Cleveland Avenues, Milwaukee, manufacturer of electrical stoves, ranges and appliances, and its affiliated company, the Alcazar Range & Heater Co., kerosene, oil and gas stoves, have plans for a \$400,000 warehouse and distributing building to be erected in Chicago on the Chicago & Northwestern belt line at Washington Boulevard. It is stated that no manufacturing operations will be carried on in the new Chicago plant, but that space released in the Milwaukee works by the warehousing and sales departments will be devoted to production. While definite specifications have not been completed, it is known that a considerable list of additional equipment will be required. Albert L. Lindemann is vice-president and general manager.

The Carbon Engineering Co., 252 Milwaukee Street, Milwaukee, manufacturer of carbon specialties, has acquired a site at 1700 Eighth Avenue for a new plant, the first unit, 40 x 100 ft., one story. The general contract has been let to Starck Brothers, 256 Twenty-third Avenue, local. William Helwig is general manager.

The Common Council, Kenosha, Wis., has purchased a triangular site, 24 x 30 x 198 ft., at Pearl, Congress and Garden Streets, from the Chicago & Northwestern Railroad

Co., and has directed the city engineer to prepare plans for a garage, warehouse and service station for municipal vehicles and equipment. Bids probably will be asked about July 10.

The Bower City Stamping Co., Janesville, Wis., incorporated several months ago with \$10,000 capital to manufacture metal stampings, mechanical appliances, etc., has increased its capital to \$25,000 and will enlarge its factory at 822 Beloit Avenue. Additional equipment will be purchased for a new department to manufacture non-slip hooks for vises. Carl Johnson is vice-president and general manager.

The Milwaukee Board of School Directors, Tenth and Prairie Streets, is asking bids for the construction of the east center wing addition to the Boys' Technical High School, at College Place, Hanover and Greenbush Streets. Bids close June 26. The work is to be completed by June 30, 1925, and the necessary shop equipment will not be purchased until Dec. 1 or Jan. 1 for delivery between May 15 and July 1, 1925. Frank M. Harbach is secretary and business manager.

The Oneida Chuck Co., Rhinelander, Wis., has been organized with \$15,000 capital stock by Arthur J. Lamotte, E. A. Forbes and R. J. LaSelle to establish a machine shop specializing in the manufacture of chucks and other mechanical specialties.

The Standard Sanitary Mfg. Co., Pittsburgh, has plans by the Hunting-Davis Co., 1150 Century Building, Pittsburgh, for a five-story building, 80 x 175 ft., to be erected at Seventeenth Street and St. Paul Avenue, Milwaukee. It will be used for manufacturing, assembling and general warehouse depot, replacing the present branch plant at 311 Fifth Street. The Milwaukee office and showrooms are at 428-430 Broadway. F. E. Fowle is branch manager.

The Hartford Tool & Machine Co., Hartford, Wis., is enlarging its machine shop and is in the market for some equipment. Fred F. Jordon has recently acquired the interest of John Meser and is continuing the business alone.

Hugo & Bothe and Julius Krueger, Kenosha, Wis., are forming a company to manufacture hardware specialties, principally a combined window and safety lock and hinge for office building windows to facilitate washing from the inside and for ventilating. A small shop is to be leased.

The Milwaukee Die & Tool Co., 136 Reed Street, Milwaukee, which some time ago made provision for engaging extensively in the die casting business, will enlarge this department and install some new equipment within a short time. The corporate name has been changed to Advance Tool & Die Casting Co. Louis F. Picker is secretary.

The Rhinelander, Wis., Paper Co., manufacturer of news print, will build a \$50,000 addition, 42 x 108 ft., according to plans by L. A. DeGuere, consulting engineer, Wisconsin Rapids. The work involves enlargement of the water supply and hydroelectric generating capacity. Paul Frederickson, Rhinelander, is general contractor. H. C. Hanke is general manager.

South Atlantic States

BALTIMORE, June 16.

IN connection with the hydroelectric power project on the Susquehanna River, Conowingo, Md., by the Susquehanna Power Co., Delta, Pa., the Philadelphia Electric Co., Philadelphia, is said to have secured options on a majority of stock of the company and proposes to increase the power project to an ultimate station of 500,000 hp., instead of 300,000 hp., and will take active charge of the development. It will cost \$35,000,000.

The board of District Commissioners, District Building, Washington, will take bids until June 24 for manual training equipment, steel lockers and other apparatus for the new Eastern high school. Specifications on file at Room 427.

R. S. Armstrong & Brother Co., Atlanta, Ga., machinery dealer, has inquiries out for a double-drum electric hoist, about 40-hp. capacity; one 150-kw. generator, three-phase, 60-cycle, direct-connected to steam engine, and one orange peel bucket, about 1 yd. capacity.

The Terminal Freezing & Heating Co., 430 South Eutaw Street, Baltimore, has secured permission to issue notes for \$100,000, a portion of the proceeds to be used for extensions, improvements, etc. A cold storage plant is now being operated at 408 South Eutaw Street.

The Columbus Electric & Power Co., Columbus, Ga., has secured a preliminary permit for a power dam on the Chattahoochee River, near Bartlett's Ferry, for a hydroelectric power plant with initial capacity of 80,000 hp.

Y. S. B. Gray & Son, Griffin, Ga., are in the market for a 40-hp. boiler and accessory equipment; deep-well pumping equipment; 2000 gal. capacity water tank; canning retorts and other apparatus.

The Seaboard Terminal Corporation, Baltimore, care of Jerome Sloman, Union Trust Building, attorney, has secured property at Curtis Bay, between Cabin Branch and Curtis Creek, as a site for its oil refining and distributing plant, for which plans are nearing completion. It will cost close to \$750,000 with machinery.

The Common Council, Westminster, S. C., will install a pumping plant in connection with proposed extensions in the waterworks and sewage plants, for which bonds for \$150,000 have been sold.

The Summerville Cotton Mills, Summerville, Ga., are perfecting plans for the complete electrification of their plant, replacing steam power equipment, and will install motors, controls and other electrical apparatus. The work will be carried out in connection with an expansion program to cost \$300,000. John D. Taylor is president.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids until June 24 for one refrigerating machine for the Norfolk Navy Yard, schedule 2307; for 208 pressure valves and 104 springs for various yards, schedule 2319; until July 1 for a quantity of wrenches, schedule 2321; until June 24 for individual forced-draft blower equipment, schedules 2334 and 2335; for 16,000 ft. electric wire for the Annapolis yard, schedule 2346; until July 1 for commutator slotters, saws and boxes, for Eastern and Western yards, schedule 2327, and until June 24 for fuel oil pumps, spare parts and wrenches for the Puget Sound Navy Yard, schedule 2336.

The Hackley Morrison Co., Inc., 1708 Lewis Street, Richmond, Va., machinery dealer, is in the market for a 20-in. drill press; one 16 to 18-in. lathe; electric motors, 25, 40, 100 and 250-hp., three-phase, 60-cycle, 2300 volts; one 36-in. gage, industrial locomotive, about 8 to 10 tons capacity; 250 and 400 kva. electric generators, three-phase, 60-cycle, 2300 volts and one 100-hp. boiler.

The Savannah Blow Pipe Co., Savannah, Ga., has plans under way for the erection of a one-story addition estimated to cost \$25,000.

The Lester-Ricks Oil Co., Byromville, Ga., is in the market for a return tubular boiler, about 70-hp. capacity.

The Baltimore Copper Smelting & Rolling Co., Canton, Baltimore, is said to have plans for a one-story rod and wire mill, with a number of other extensions and improvements. The company is a subsidiary of the American Smelting & Refining Co., 120 Broadway, New York.

The chief of engineers, United States Army, Washington, has authorized the local corps of engineers to purchase a number of machine tools, for which bids will be asked by the district engineer in the near future.

The Carolina Canning Co., Aberdeen, N. C., is in the market for a 40-hp. steam engine and accessory equipment, and a 50-hp. horizontal return tubular boiler.

The supply officer, Navy Department, Washington, has been authorized to purchase 15 portable grinders, ordnance req. 463.

The Park Circle Motor Co., 3400 Reistertown Road, Baltimore, has plans for a two-story service and repair building, 50 x 95 ft., for which foundations will soon be laid. Stanislaus Russell, 11 East Lexington Street, is architect.

Pacific Coast

SAN FRANCISCO, June 11.

WORK will begin on a new hydroelectric power plant by the California-Oregon Power Co., 454 California Street, San Francisco, to be located near Copco, Cal., on the Klamath River, with capacity of 40,000 hp. The company will also build a new hydroelectric power plant on the Link River, near Klamath Falls, Ore., with capacity of 4250 hp., and will construct an 80-mile steel tower transmission line from the Copco plants to Delta, Cal. A recent bond issue of \$4,000,000 will be used for the projects, and a new bond issue of \$2,500,000 for like purpose is now being sold.

The Union Construction Co., Oakland, Cal., will rebuild the portion of its shipyard on the Key Route Fill, recently destroyed by fire. A new machine shop, pattern shop and other buildings will be erected with cost estimated at \$300,000 including equipment.

The Board of Education, Los Angeles, will soon break ground for a one-story manual training shop at the Berendo Junior high school, estimated to cost \$40,000 with equipment.

The Doty Fish Co., Kalama, Wash., has tentative plans for rebuilding its power house and cold storage plant, partially destroyed by fire June 2, with loss estimated at \$100,000 including equipment.

The Western American Concrete Co., Los Angeles, has acquired property at Glendale, near Los Angeles, for a new plant to manufacture cast concrete products. An

affiliated organization, the Western American Hardwood Products Co., will build a plant on adjoining site. The machinery installation in both works is estimated to cost \$50,000. Frank M. Coryell is general manager.

The Electric Steel Foundry Co., Twenty-fourth and York Streets, Portland, has engaged J. F. Hoss, Portland, architect, to prepare plans for its one-story foundry, 50 x 160 ft.

The Hall Scott Motor Co., Fifth Street and Snyder Avenue, Berkeley, Cal., manufacturer of automobile equipment, has awarded a general contract to the Austin Co., Santa Fe Building, San Francisco, for a new one-story plant, estimated to cost \$30,000 with equipment.

Fire, June 6, destroyed a portion of the works and distributing plant of the Renwick Implement Co., Billings, Mont., with loss estimated at \$80,000, including equipment and stock. It is planned to rebuild.

The Puget Sound Power & Light Co., Seattle, is disposing of a bond issue of \$20,000,000, a portion of the proceeds to be used for extensions in generating plants and system. Frederick S. Pratt is chairman of the board.

A power plant, electric ovens, conveying and other equipment will be installed in the three-story and basement plant, 150 x 200 ft., to be erected by the Davis Standard Bakery Co., Los Angeles, at 1058 Mignonette Street, estimated to cost \$110,000. C. C. Ruppenthal, 2075 West Washington Boulevard, is architect.

Superstructure work will begin on the new steam-operated electric generating plant to be erected at Terminal Island, Long Beach, Cal., by the Southern California Edison Co., Los Angeles, for which plans have been completed by Stone & Webster, Inc., 147 Milk Street, Boston, engineer and contractor. It will be 270 x 270 ft., estimated to cost \$1,250,000, with turbo-generators and other machinery.

The Pioneer Rubber Co., Pittsburgh, Cal., is considering plans for rebuilding the portion of its plant recently destroyed by fire with loss estimated at \$40,000 including machinery.

Canada

TORONTO, June 16.

A GOOD demand for machine tools is reported in this market. Inquiries of the variety that usually turn into sales are also more numerous and cover practically every line of industrial activity. According to business already closed, Canadian selling interests are of the opinion that June will prove a record month.

Bids will be received by Hugh L. Kerr, chairman advisory industrial committee and W. M. Pearse, business administrator and secretary-treasurer of the Board of Education, 155 College Street, Toronto, until June 23 for foundry equipment for the Riverdale branch of the technical school.

The Lefroy Engineering Co., 11 Leader Lane, Toronto, is in the market for a 5-foot power squaring shear for 16 gage sheet or lighter.

NEW TRADE PUBLICATIONS

Steel Warehouse Hand Book.—Morris, Wheeler & Co., Thirtieth and Locust Streets, Philadelphia. Publication, containing weights and extras (mill and warehouse), on bars, sheets, shapes, plates, hoops, bands, cold rolled steel, rails, tire steel, Swedish iron, boiler tubes, etc., also gage tables, quantity differentials and plate and shape cutting extras.

Automobile Assembly Equipment.—C. M. S., Inc., Tarrytown, N. Y. A series of illustrated bulletins bound together in loose-leaf form illustrating and describing various equipment and methods installed in automobile assembly plants by this company. Among the articles described are the following: Low clearance type flow-motor for application of paints, varnishes, enamels, etc.; spray booth in standard sizes; automobile sheet metal and small parts enameling equipment; portable ovenette; portable one-man conveyor-type oven.

Grinding and Polishing Machinery.—Cleveland Armature Works, Inc., 4732 St. Clair Avenue, Cleveland. Catalog describing grinding, buffing and polishing machinery.

Punches and Shears.—Cleveland Punch & Shear Works Co., Cleveland. Booklet on the features of

The Electric Light & Power Works Commission, Kincardine, Ont., is asking for a used 30 or 35 hp. motor, 220 volt, three phase, 60 cycle, from 1200 to 1800 r.p.m., complete with base and starter, motor with pulley shafts extending both ends of preferred and a used 18-in. double head ball bearing grinder.

W. T. Wilton, Hagersville, Ont., is in the market for one 15 hp. and one 20-hp. motor, three phase, 60 cycle, 550 volts.

Bids will be received by W. W. Hiltz, chairman Board of Control, Toronto, until Aug. 5, for the supply and delivery of the following: Two 2,880,000 Imperial gal. centrifugal sewage pumps and motors; one 3,000,000 Imperial gal. centrifugal sludge pump and motor; also 24-in., 30-in. and 36-in. valves. Specifications and form of tender can be obtained from the Works Department, room 12, City Hall, Toronto.

H. D. Farrell, Sprucedale, Ont., is in the market for complete equipment for a sawmill.

M. Milner, 55 Colborne Street, Kingston, Ont., is in the market for equipment for a machine shop.

The C. W. Petrie Cream Separator Co., Hamilton, Ont., is asking for equipment for a plant at Orangeville, Ont.

A. Bonin, 74 Principale Street, St. Laurent, Que., will establish an automobile repair plant and is interested in equipment.

The Gloucester Lumber & Trading Co., Bathurst, N. B., is in the market for complete equipment for a sawmill. W. G. White is purchasing agent.

The Maclean & Holt Co., St. John, N. B., is in the market for equipment for a molding shop and foundry. J. L. McAuty is purchasing agent.

The Lakefield Brass & Metal Works, Lakefield, Ont., is having plans prepared for a new plant and will soon ask for bids. Considerable machinery and tools will be purchased.

The Walsh Plate & Structural Works, Ltd., Drummondville and Montreal, is contemplating the erection of a steel plant at Valleyfield, Que., to cost \$200,000.

Parsons-Ed Co., Ltd., Moncton, N. B., has the general contract for the erection of a pulp mill at Sheet Harbor, N. S., for the Albany Perforated Wrapping Paper Co., Albany, N. Y., to cost \$50,000. The Eastern Canada Steel & Iron Works, Ltd., Quebec, has been awarded contract for the structural steel.

The Bala Electric Light & Power Co., Bala, Ont., has awarded a general contract to Allen Dixon for the erection of a power plant to cost \$30,000.

The planing mill and machine shop owned by John Stirrett & Sons, Port Arthur, Ont., were destroyed by fire with loss to building and machinery amounting to \$50,000.

The manufacture of Darling fire hydrants and gate valves in Canada, formerly a product of the Dominion Steel Products Co., Ltd., will be continued by a new company, the Canada Valve & Hydrant Co., Brantford, Ont., and will operate under the license from the Darling Valve & Mfg. Co., Williamsport, Pa. The new concern was organized by H. K. Jordan, formerly sales manager Dominion Steel Products Co., and with him are associated E. F. Roberts, as engineer, and J. Britton, superintendent.

Cleveland as a city, with pages of general illustration and description interleaved with illustrations and descriptions of the shears, punches, planers, bending rolls and other machinery built by the company.

Centrifugal Pumps.—Morris Machine Works, Baldwinsville, N. Y. 20-page bulletin No. 122, dealing with double suction pumps with horizontally split casing. The bulletin gives construction and operating details and performance curves of these pumps, showing efficiencies and other characteristics of different sizes under various conditions. These pumps are used for handling water, brine, oil, acids, pulp and chemical fluids, and for a wide variety of services. The bulletin is profusely illustrated.

Hydraulic Machinery.—R. D. Wood & Co., Philadelphia. 52-page catalog representing the seventh edition. It is devoted to the hydraulic tools and machinery produced by the company at its plant at Florence, N. J., where work has been concentrated. The present catalog is confined to machinery for the metal and rubber industries, including presses for flanging, drawing, plate bending, forming, upsetting, scarfing, forging, trimming, forcing, and a considerable variety of specialized uses, such as wheel presses, pipe testing, crank pin, straightening, etc., including also billet shears, plate and angle shears, punches, riveters, spring stripping and banding presses, etc. Hydraulic cranes, intensifiers, pressure pumps and special valves also are featured, together with the Wood gas producer and other equipment.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-Ferrous Metals."

Bars, Shapes and Plates

Bars:	Per Lb.
Refined iron bars, base price.....	3.49c.
Swedish charcoal iron bars, base.....	7.00c.
Soft steel bars, base price.....	3.49c.
Hoops, base price.....	4.59c.
Bands, base price.....	4.09c.
Beams and channels, angles and tees, 3 in. x 1/4 in. and larger, base.....	3.59c.
Channels, angles and tees under 3 in. x 1/4 in., base.....	3.49c.
Steel plates, 1/4 in. and heavier.....	3.59c.

Merchant Steel

Merchant Steel	Per Lb.
Tire, 1 1/2 x 1/2 in. and larger.....	3.55c.
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger).....	4.05c.
Toe-calk, 1/2 x 3/8 in. and larger.....	4.50c.
Cold-rolled strip, soft and quarter hard.....	7.50c. to 8.50c.
Open-hearth, spring steel.....	4.50c. to 7.00c.
Shafting and Screw Stock:	
Rounds.....	4.40c.
Square, flats and hex.....	4.90c.
Standard tool steel, base price.....	15.00c.
Extra tool steel.....	18.00c.
Special tool steel.....	23.00c.
High-speed steel, 18 per cent tungsten.....	70c.

Sheets

Blue Annealed	Per Lb.
No. 10.....	4.14c.
No. 12.....	4.19c.
No. 14.....	4.24c.
No. 16.....	4.34c.

Box Annealed—Black

Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20.....	4.45c. to 4.70c.
Nos. 22 and 24.....	4.60c. to 4.85c.
No. 26.....	4.65c. to 4.90c.
No. 28*.....	4.75c. to 5.00c.
No. 30.....	4.95c. to 5.20c.

Galvanized

Per Lb.
No. 14.....
No. 16.....
Nos. 18 and 20.....
Nos. 22 and 24.....
No. 26.....
No. 28*.....
No. 30.....

*No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Wrought Iron
Black Galv.	Black Galv.
1/2 in. Butt... -41 -24	1/2 in. Butt... -4 +19
5/8 in. Butt... -46 -32	5/8 in. Butt... -11 +9
1-3 in. Butt... -48 -34	1-1/2 in. Butt. -14 +6
2 1/2-6 in. Lap... -44 -30	2 in. Lap.... -5 +14
7-8 in. Lap... -41 -11	2 1/2-6 in. Lap. -9 +9
9-12 in. Lap... -34 -6	7-12 in. Lap. -3 +16

Bolts and Screws

Machine bolts, cut thread,	50 to 50, 10 and 10 per cent off list
Carriage bolts, cut thread,	40 to 40, 10 and 10 per cent off list
Coach screws, 50 and 10 to 45, 10 and 10 per cent off list	
Wood screws, flat head iron,	75, 20 and 10 per cent off list
Steel Wire	

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright, basic.....	4.25c. to 4.50c.
Annealed soft.....	4.50c. to 4.75c.
Galvanized annealed.....	5.15c. to 5.40c.
Coppered basic.....	5.15c. to 5.40c.
Tinned soft Bessemer.....	6.15c. to 6.40c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE	
High brass sheet.....	16 1/4 c. to 17 1/4 c.
High brass wire.....	17 1/4 c. to 18 1/4 c.
Brass rods.....	14 1/2 c. to 15 1/2 c.
Brass tube, brazed.....	24 1/4 c. to 25 1/4 c.
Brass tube, seamless.....	21 c. to 22 c.
Copper tube, seamless.....	22 1/4 c. to 23 1/4 c.

Copper Sheets

Sheet copper, hot rolled, 20 1/4 c. to 20 3/4 c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA"	Grade "A"	Coke—14 x 20	Prime	Seconds
Charcoal	Charcoal	Charcoal	80 lb..	\$6.55	\$6.30
14x20	14x20	14x20	90 lb..	6.65	6.40
IC.. \$11.75		\$9.50	100 lb..	6.75	6.50
IX.. 13.25		11.50	IC..	7.00	6.75
IXX.. 14.50		12.50	IX..	8.25	8.00
IXXX.. 15.50		13.75	IXX..	9.50	9.25
IXXXX.. 16.50		14.75	IXXX..	10.75	10.50
			IXXXX..	12.00	10.75

Terne Plates

8 lb. coating, 14 x 20	
100 lb.....	\$7.00 to \$8.00
IC.....	7.25 to 8.25
IX.....	8.25 to 8.75
Fire door stock.....	9.00 to 10.00

Tin

Straits, pig45c.
Bar48c. to .53c.

Copper

Lake ingot.....	16 c.
Electrolytic	15 1/2 c.
Casting	14 1/2 c.

Spelter and Sheet Zinc

Western Spelter	7 1/2 c.
Sheet zinc, No. 9 base, casks.....	10 1/2 c. open 11 1/4 c.

Lead and Solder*

American pig lead	8 1/2 c. to 9c.
Bar lead	11c. to 12c.
Solder, 1/2 and 1/4 guaranteed	32c.
No. 1 solder	30c.
Refined solder	26c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c. to 90c.
Commercial grade, per lb.	35c. to 50c.
Grade D, per lb.	25c. to 35c.

Antimony

Asiatic	10 1/2 c. to 11c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	36c.
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Old Metals

Cents Per Lb.
Copper, heavy crucible
Copper, heavy wire
Copper, light bottoms
Brass, heavy
Brass, light
Heavy machine composition
No. 1 yellow brass turnings
No. 1 red brass or composition turnings
Lead, heavy
Lead, tea
Zinc
Cast aluminum
Sheet aluminum